Cost and Reward as Motivating Factors in Distributed Collaborative Learning Assignments: A Grounded Theory Analysis

by

Johanna Cornelia van Niekerk
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Johanna Cornelia van Niekerk

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Co-promoter: Prof D Pottas

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DECLARATION BY CANDIDATE

NAME: Johanna Cornelia van Niekerk

STUDENT NUMBER: 20110276

QUALIFICATION: Philosophiae Doctor

TITLE OF PROJECT: Cost and Reward as Motivating Factors in Distributed Collaborating Learning Assignments: A Grounded Theory Analysis

DECLARATION:

In accordance with Rule G4.6.3, I hereby declare that the above-mentioned thesis is my own work and that it has not previously been submitted for assessment to another University or for another qualification.

SIGNATURE:

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Abstract

The objective of this research study was to obtain a better understanding of the factors that affect lecturer and student participation in distributed collaborative learning assignments (DCLAs). A substantial number of courses worldwide have included DCLAs in their curricula in an attempt to teach students virtual communication and teaming skills, and to allow distributed students to learn course content collaboratively in a virtual environment. The execution and management of these assignments have proven to be more challenging than expected. Several attempts reported on in the literature had to be abandoned when cost exceeded the rewards for both lecturers and students. In a four-year cyclical action research project carried out at the PETech (Port Elizabeth Technikon, currently part of the Nelson Mandela Metropolitan University, South Africa), ICT students at several of the PETech campuses were required to complete a DCLA in virtual teams. This project also had to be terminated when it was realised that virtual team learning was minimal and the time investment unacceptably high.

For the research study reported on in this thesis the data collected during the four “pre-research” cycles and the experiences reported in the literature were analysed. The lessons learnt were applied to a new additional DCLA cycle which formed part of an ICT course, although this execution still showed room for improvement. A second additional cycle was then executed which had a high participation rate and was overwhelmingly labelled by the participating students as a valuable and enjoyable learning experience.

Analysis of the factors affecting participation in DCLAs shows that they are numerous and tightly interlinked, and that each factor is able to take on a wide range of values. This complicates descriptive reporting as each of the DCLAs was unique with unique outcomes and would have to be reported as such in order to
gain an understanding of the factors. Hence, a level of abstraction was needed, which was accomplished by applying the traditional Glaserian grounded theory method to the data collected during the four “pre-research” and the two additional cycles, and from the literature on the topic. The outcome is a perceived costs and rewards (PCR) theory for participation in DCLAs. As participation is crucial for the learning experience of each student as well as his/her team members in an action learning environment, deciding on participation by continually calculating the costs versus rewards became the focal point of the theory.

To the best of the author’s knowledge this research study makes a *theoretical contribution* to the existing body of ICT educational knowledge in the form of a perceived costs and rewards theory for DCLA participation and a *practical contribution* in that it provides a theory that can be used to explain, understand, interpret and predict participation in DCLAs. This research study provides guidance for future research in both of these areas.

**Keywords:** Distributed collaborative learning, virtual team learning, action learning, participation motivation, learning costs and rewards, perceived costs and rewards theory, Glaserian grounded theory
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1.1 Introduction

In distributed collaborative learning assignments (DCLAs) students complete an assignment in virtual teams with members who are not all co-located. The level of virtuality can vary from cases where all members reside in different locations, to subteams that are situated in different locations but the members are co-located in the subteams. Members communicate with their distant team members by means of technological tools in a synchronous same-time-different-place mode (using tools such as chats or video conferencing) or an asynchronous different-time-different-place mode (using tools such as emails and forums). The reasons for adding DCLAs to course modules include learning virtual teaming skills; learning how to use technological communication tools; collaborating with members across the world to learn about cultural differences; and collaborative subject content learning.

Course modules that include these methods cover a wide range of disciplines, for example, ICT (e.g. Daniels, Petre, Almstrum, Asplund, Björkman, Erickson, Klein, & Last, 1998; Alexander, 2002; Taylor, 2005), Group Dynamics (De Hart, 2005), Communication and Computer Mediated Communication (e.g. Vician & Brown, 2000; Jensen & Heilesen, 2004; Taylor, 2005), Reading, Writing and Critical Thinking (Taylor, 2005), Journalism (Taylor, 2005), Financial Accounting (Taylor, 2005), Education (Paulus, 2005; Okada, 2005; Marcellino, 2007), Media Studies (Buelens, van Mierlo, Van den Bulck, Elen & Van Avermaet, 2005), and Business Administration (Ocker, 2005; Stacey, 2005), to name but a few.

Although successes have been reported in the use of DCLAs (e.g. Baheti, Williams, Gehringer, Stotts, & Smith 2002; Qureshi, Liu & Vogel, 2004; Taylor,
where students felt positive towards the assignments and some participated voluntarily, the opposite experience has been more common. In a substantial number of the DCLAs reported on in the literature student participation was low, the students were uncommitted and the extra time required from lecturers was very high (e.g. Edwards & Clear, 2001; Pencek & Bialaszewski, 2001; Alexander, 2002; Cogburn, Zhang & Khothule, 2002; Pauleen & Yoong, 2004; Beranek & Martz, 2005; Bue\l\_ens \textit{et al}., 2005; De Hart, 2005; Ocker, 2005; Taylor, 2005; Olson-Buchanan, Rechner, Sanchez & Schmidtke, 2007).

The lack of lecturer observability in DCLAs, due to students being able to work anywhere and anytime, results in less control by lecturers and by team members and creates opportunities for non-participation, low commitment, free-riding (students not contributing but receiving marks), the “sucker effect” (one or two students doing all the work in the team), and domination by single students who do not allow others to participate. This inequity causes considerable frustration among students (Jarvenpaa & Leidner, 1999; Vogel, Davison, Schroff & Qureshi, 2001; Sudweeks, 2003; Akar, Öztürk, Tunçer & Wiethoff, 2004; Häkkinen, 2004; Qureshi \textit{et al}., 2004; Bue\l\_ens \textit{et al}., 2005; Birch & McDonald, 2007; Glückler & Schrott, 2007). Although participation is a common problem, none of more than sixty research items on DCLAs in the literature that were investigated for this thesis focused on it (see Chapter 3). Pauleen and Yoong (2004) moved their research from student teams to virtual teams in industry, and others, such as Alexander (2002), removed the DCLAs from their course modules.

Student participation is important in a distributed collaborative learning environment, because if a student does not participate, not only is his/her own learning experience compromised, but it also affects the learning experience of each of the other team members. Some authors in the literature refer to measures implemented to promote participation, such as high mark weightings (e.g. Pencek & Bialaszewski, 2001; Beranek & Martz, 2005; De Hart, 2005; Ocker, 2005),
tracking of communication (Olson-Buchanan et al., 2007), and special prizes (Glückler & Schrott, 2007). These do not seem to have had the desired effect, however. High mark weighting can be seen as being unethical as students’ marks are affected by other students over whom they have little control and could cause students to fail the course module. Communication patterns do not necessarily correlate with participation patterns and tracking communications comes at a high time cost to the lecturers. Special prizes might be a motivator for the better teams/stronger students, but provide little incentive for the weaker teams/students who accept that they will not be contenders for the prizes.

In an educational setting lecturer participation and commitment is also important. The lack of visibility of student communication and execution of the DCLA due to students working at different locations and at different times, though, makes it difficult for the lecturers to manage student participation and commitment. It requires an increase in control with an accompanied increase in costs for the lecturers. Hoag and Baldwin (2000) comment on the extensive lecturer effort needed and Olson-Buchanan et al. (2007) maintain that institutions and faculties greatly underestimate the time and resources required for implementing DCLAs. Sullivan, Terpenny and Singh (2004) question whether the student learning in virtual teams justify the additional investment in time. The DCLAs reported on by authors such as Alexander (2002) and Taylor (2005, several cases) were terminated due to this problem, even with a small number of teams. This means that the students’ learning rewards comes with a disparate high cost for the lecturers.

Unless DCLAs can be executed with low lecturer costs and high student participation, they are not worthwhile for either the lecturers or the students. How to accomplish this became the challenge of this research study.

The remainder of this chapter describes the setting for the research reported on in this thesis. Firstly, a short overview is given of the background and the motivation
for this research. This is followed by the research question, a brief discussion of the research approach and a map of the thesis. The chapter is concluded with a list of abbreviations used in this thesis.

1.2 Background to this research study

In 1997, the introduction of DCLAs into our ICT course at the Port Elizabeth Technikon (PETech) (a technological university currently forming part of the Nelson Mandela Metropolitan University in South Africa) was a logical progression in the ICT curriculum. Developments on the Internet and in networking areas, the mergers of companies, the variety of people involved in a software development project, and the need for scarce expertise in industry ICT teams that is not always locally available, were some of the main reasons for the creation of virtual teams in the ICT industry. ICT professionals had to learn how to extend teaming beyond the face-to-face realm across different departments, companies, cities and the world using electronic tools. The introduction of DCLAs into the ICT curriculum would create an action learning environment in which students could learn electronic communication and virtual teaming skills. At first, this seemed to be an easy task; however, the lecturers were unprepared for the difficulties experienced in carrying out DCLAs in an education environment.

At the PETech, the Information Systems I (IS1) module of the National Diploma: IT was taught on different campuses, that is, the main campus at Port Elizabeth, a satellite campus at East London, and another satellite campus at George. The module was also taught as part of a related course on a second campus at Port Elizabeth within walking distance of the main campus. This meant that the environment existed in which action learning DCLAs could be carried out. “Action learning”, the term used here, means that the students would be actively involved in learning whilst participating in the assignment. The students would also be “distributed”, as used in this context, because each team would consist of students at each of the different campuses.
Initially, four DCLAs were carried out over a period of four years (one per year) from 1997 to 2000. At that time, I was not the researcher involved in this project (referred to as the pre-research in this thesis); however, I was a participating lecturer on the George campus in the second to the fourth cycles. Although the assignments were fairly simple, the problems experienced were severe and unexpected. In each cycle the problems of the previous cycle were addressed, but the time investment required from the participating lecturers escalated. Eventually, the assignments had to be discontinued when the costs in terms of time investment became so high that the lecturers at the satellite campuses refused to continue to participate. Student participation was low at most of the campuses and the learning aims were not being achieved. Hence, the costs outweighed the rewards by far. This resulted in a substantial amount of ill feeling among the students, the participating lecturers, the researcher (Brown), and her supervisor. The research was abandoned and only one paper describing the problems experienced in the pre-research was published (Thomas & Brown, 2001).

Although each DCLA in the pre-research had been analysed and improvements made for the next cycle, the changes in one factor affected several others in unexpected ways. The factors that affect the execution of DCLAs are numerous and tightly interlinked, and each factor can adopt a wide range of values. This makes each DCLA unique with unique results. For example, De Hart (2005) experienced low participation even though the assignments weighed 30% of the class mark. Her large team size allowed for free-riding, and participation was affected by miscommunication that led to costly ill feelings. Taylor’s teams (2005) were affected by factors such as team size, slow reaction by some members, slacking during the assignment and working hard towards the end, students not reviewing each other’s work, communication difficulties owing to not having met the other team members in person, assessment issues, high time demands, requests for individual grades, students preferring to work independently, difficulty in keeping students committed, and technical problems.
To make it worthwhile to participate in the DCLAs, the costs for lecturers and students would have to be reduced and/or the rewards increased. This required a better understanding of the factors affecting DCLAs.

1.3 Motivation for this research study

An investigation of the literature showed that our experiences were not unique. The value of DCLAs for the students was not contested; however, what was contested was the fact that the DCLAs were not viable for the lecturers and students as a result of being expensive with little rewards (Vogel, Lou, van Eekhout, van Genuchten, Verveen & Adams, 2000; Munkvold & Line, 2002; Paulus, 2005; Taylor, 2005; Birch & McDonald, 2007).

The literature revealed that the assignments could be made worthwhile, for example, in the study reported on by Gatlin-Watts et al. (2007), approximately seven hundred students from seven countries participated in teams with the aim of exchanging cultural information. Some students continued corresponding with their fellow team members after the assignments had been completed, and some participated voluntarily again the next year. In an international study conducted by Qureshi et al. (2004), Hong Kong students rated their DCLAs the highest of all their course activities. The reason for these successes was puzzling, as the students in these DCLAs did not seem to be motivated by marks or other tangible benefits, as was commonly believed (e.g. Jarvenpaa & Leidner, 1999; Burke, 2001; De Hart, 2005; Whatley, Bell, Shaylor, Zaitseva & Zakrzewska, 2006; Glückler & Schrott, 2007).

I experienced a similar phenomenon during the pre-research. My students expressed concerns that their course module marks might be negatively affected by an assignment they had very little control over. I encouraged them to participate by pointing out the value of the learning experience and by promising that if the DCLA marks negatively affected their course module year marks, they would be eliminated. My campus had a high participation rate compared to the other
campuses, and when the assignments were terminated, my students were very disappointed. This was contrary to the experiences on the other campuses where the participation rate was low and the students disliked the assignments intensely (see Chapter 4). This meant that more factors played a role in promoting student participation than marks alone. None of the 68 research items on DCLAs in the literature (retrieved from research databases, books and research theses over a period spanning from 1995 to 2008 – see Chapter 3) focuses on the problem of participation, although several authors admitted that they had experienced low participation rates (e.g. Burke, 2001; Pencek & Bialaszewski, 2001; Cogburn et al., 2002; Beranek & Martz, 2005; Buelens et al., 2005).

The motivation for the research reported on in this thesis is, therefore, to fill a gap in the existing body of knowledge regarding the factors that affect lecturer and student participation in DCLAs. With a better understanding of the factors and their interrelationships DCLAs can be planned to minimise the costs and maximise the rewards for the participants. If the rewards outweigh the costs, it will be worthwhile for the lecturers and students to participate in DCLAs. If not, it will have been shown that the DCLAs are not viable and their use will need to be reconsidered.

1.4 Research question

An analysis of the experiences recorded in the pre-research and the literature showed a concern among lecturers and students that DCLAs carry a high cost and that doing them is not worthwhile. This concern was present at the start, and grew during participation in these assignments as hidden costs were uncovered and the participants realised that the costs kept on increasing, often surpassing the potential rewards.

The question that emerged during the pre-research DCLA cycles and became the focus of this research study is therefore:
What factors affect the lecturers’ and students’ participation in DCLAs, and how are these factors related?

The aim of the research was to develop a theory that can be used to understand, explain, interpret and predict participation in DCLAs (see Chapter 7).

1.5 Research approach

The four pre-research cycles were analysed (see Chapter 4) and then augmented with an analysis of the literature (see Chapter 3) to identify the factors and their interrelationships that affect the participation of lecturers and students in the DCLAs. The literature study covered the areas of co-located collaborative learning, distributed collaborative learning, co-located teaming, and industry virtual teaming, although, owing to limitations on length, only co-located collaborative learning and distributed collaborative learning are reported on in Chapter 3.

One new additional DCLA cycle was planned and executed in 2003. The lessons learnt from the pre-research and the literature study were applied to this cycle in an attempt to make participation more worthwhile for the lecturers and students. It also allowed me to investigate the participation, and collect data on the students’ experiences while doing the DCLA. The data collection is described in Chapter 2 and the what, how, why, who, where, and when aspects of the cycle are discussed in Chapter 5. The participation rates were still low on one of the two campuses that had participated and an analysis of the data collected indicated that the low participation could be ascribed to several problems areas that still existed.

The lessons learnt in the first additional DCLA were applied to a second additional DCLA in 2004. Although not all the problems identified in the first cycle could be addressed, only one student did not participate in this cycle. This came as a surprise as the incentives such as high mark weightings and high lecturer facilitation, which were identified by the students as problems in the first cycle, could not be improved for the second cycle. In a survey conducted at the end of
this cycle only a few of the students identified high marks as their main incentive for participation. Stronger motivators included aspects such as excitement, looking forward to a challenge, and fun. The second additional cycle is described in Chapter 6, while the data collection is described in Chapter 2.

The data collected during these two additional cycles, together with the data obtained from the pre-research and the information gleaned from the literature, proved to be enough to develop a perceived costs and rewards (PCR) theory using the Glaserian grounded theory (GGT) method (see Chapter 2 for a discussion on the GGT method, and Chapter 7 for the PCR theory). The theory has the ability to explain, understand, interpret and predict participation in DCLAs and can be used by organisers to assess the viability of a DCLA or identify areas for improvement.

Chapter 8 briefly illustrates the applicability (transcendence and grab) of the PCR theory to co-located interdisciplinary collaborative learning assignments. These assignments were a continuation of the research reported on in this thesis when DCLAs had to be discontinued (costs of DCLAs for the lecturers remained too high for the rewards to make the assignments viable without my involvement and research interest). Future research possibilities include a more intensive study of the applicability of the PCR theory in other substantive areas where participation decisions need to be made. In the remainder of Chapter 8, the PCR theory is briefly compared to other related existing social theories, namely, economic cost-benefit analysis, rational choice theory, and the social exchange and Nye’s social choice theories.

1.6 Map of thesis

Chapter 1 describes the problem addressed in this research, the background and motivation for this research, the research question and the research approach; it also contains a map of this thesis and a list of abbreviations.
Chapter 2 gives the philosophical underpinning of this research, a brief description of the traditional Glaserian grounded theory (GGT) research method; the application of the GGT to the data collected during the pre-research DCLA cycles, the two additional DCLA cycles and the information on DCLAs in the literature; and a description of the data collected during the four DCLA cycles in the pre-research and the two additional DCLA cycles executed for this research study.

Chapter 3 discusses the factors affecting DCLAs and student and lecturer participation as identified in the literature.

Chapter 4 describes the factors that affected the four pre-research cycles.

Chapters 5 and 6 cover the factors that affected the first and second additional DCLA cycles respectively.

Chapter 7 presents the PCR theory for DCLA participation, which is generated based on the data collected in Chapters 3, 4, 5 and 6 using the GGT method.

Chapter 8 briefly demonstrates the transcendence of PCR theory to the substantive area of co-located interdisciplinary collaborative learning assignments and concludes with a brief discussion of existing related theories.

In the final chapter, Chapter 9, the research is reflected on. This includes a review of the success of this research study in answering the research question; the contribution made to the existing body of knowledge; limitations and restrictions; the lessons learnt; opportunities for future research and concluding remarks.

1.7 Abbreviations

Although the use of abbreviations was kept to a minimum, a few abbreviations were adopted to improve the readability of the thesis.

DCLA – Distributed collaborative learning assignment

GGT – Glaserian grounded theory

GT – Grounded theory
ICT – Information and communication technology

PCR – Perceived costs and rewards

PETech – Port Elizabeth Technikon (currently part of the Nelson Mandela Metropolitan University)

QDA – Qualitative data analysis

1.8 Summary

This chapter introduced the research for this thesis. A four-year pre-research cycle that occurred before the start of this research had to be terminated when lecturers refused to carry on participating. Student participation and commitment were also very low. Similar experiences have been reported in the literature, but also success stories, therefore, understanding the factors that affect participation in DCLAs and how they are interlinked became the focus of this research study. This chapter covered the background to and motivation for the study, the research question, the research approach, a map of the thesis and a list of the abbreviated used. The following chapter (Chapter 2) discusses the philosophies underpinning this research, the methods used and the data collected.
Chapter 2

Research Methodology

2.1 Introduction

The research for this thesis focused on a problem situated in an educational setting. It is “located in a knowledge-producing community”, implying that it is a social practice (Usher, 1996:34), placing it in the category of social research. The social sciences have as their aim the “study of people – their beliefs, behaviour, interaction, institutions, and so forth” (Neuman, 2003:7). The less rigorous methodologies used to study the social sciences in contrast to those generally used in the natural sciences leave the social researcher with a much larger set of philosophies and methodologies to consider.

This chapter covers the philosophical and methodological approaches followed in this research study. Firstly, ontology and epistemology are briefly discussed, as well as the philosophies of human nature. This is followed by a discussion on the research dimensions, theory, methodology and research methods, specifically, the grounded theory method. The chapter concludes with a description of the data collected.

2.2 Philosophies underpinning the research

Ontology refers to the nature of the social phenomenon under investigation. The world can be viewed objectively where it is deemed to be hard, real and external to the individual (also referred to as realism), or subjectively as softer, personal and humanly created (also referred to as relativism) (Burrell & Morgan, 1979; Cohen & Manion, 1994). The experiences of the lecturers and students who participated in the DCLAs were personal and humanly created and not external to the participants, although there were external influences. This research study
therefore assumes a predominantly subjective approach, whilst acknowledging that a realistic world also exists.

*Epistemology* is concerned with the forms and nature of knowledge, how it can be acquired, and how it can be communicated to others (Burrell & Morgan, 1979; Cohen & Manion, 1994). Knowledge can be viewed as hard, real and tangibly transmittable (positivist approach), or softer, spiritual/transcendental, and based on experience and insight unique to the individual and personal in nature (interpretive approach). Although these two views form the two dominant epistemological approaches, other views exist, namely, critical theory (Straub, Gefen & Boudreau, 2005), realism (Saunders, Lewis & Thornhill, 2003), feminism and postmodernism (Neuman, 2003). This research adopts an interpretive approach. The educational environment under examination is characterised by lecturers constantly interacting, adjusting, reckoning, evaluating, bargaining, acting and changing in their quest to transfer knowledge to students. Therefore, the environment is volatile and in constant flux limiting the understanding that can be attained through the rigidity of the positivist approach.

*Human nature* is classified as mechanical at the one extreme (determinism), and as free will at the other (voluntarism) where individuals create and control their own environment. Most researchers position themselves somewhere in between these two extremes (Burrell & Morgan, 1979). This research study follows the trend of the majority of researchers including elements of both views.

### 2.3 Research dimensions

The research dimensions address the aim of the research findings (basic or applied), the purpose of the research (exploratory, descriptive or explanatory), and time (cross-sectional, longitudinal and case studies) (Neuman, 2003).

*Basic or applied:* Basic research is aimed at understanding the fundamental social reality and at advancing fundamental knowledge about the social world. According
to this approach the researcher takes care to apply proper research methodologies. Applied research is conducted to study a specific concern or to seek solutions to an existing problem. In terms of this type of research, researchers are generally less concerned about exact research methodologies, being prepared to make trade-offs to find quick solutions (Neuman, 2003). The research in this thesis is a combination of both basic and applied research. It follows the grounded theory method which consists of rigorous processes, but also allows for creativity, to develop a theory to understand aspects of social reality. On the other hand, it addresses a concern in an educational environment and the theory generated assists in finding solutions to an existing problem.

*Exploratory, descriptive or explanatory:* The purpose of the research can be exploratory, descriptive or explanatory, or a combination of two or all three (Neuman, 2003; Saunders *et al*., 2003). This research covers all three areas: exploratory – the reasons for participating were not well understood and new DCLAs were created to gain a better understanding; descriptive – to illustrate the DCLAs executed at the PETech and the factors affecting them and their interrelationships; and explanatory – theory was developed to explain the underlying concerns of participation.

*Time dimension:* A particular phenomenon can be studied at a particular instance in time (cross-sectional) and data are often collected by means of surveys or interviews. Longitudinal research traces changes over time; it is more powerful, but also more complex than cross-sectional research (Neuman, 2003; Saunders *et al*., 2003). In addition to cross-sectional and longitudinal research, Neuman (2003) includes a third option – case studies. According to this method, a few cases are examined in depth over a period of time and the data obtained are usually more detailed, varied and extensive than those obtained from a longitudinal study. This research study is based on case studies, with each yearly execution cycle of a DCLA constituting one case study.
2.4 Theory

Neuman (2003:42) defines social theory as “a system of interconnected abstractions or ideas that condenses and organizes knowledge about the social world”. The purpose of theory is to organise facts, laws, concepts, constructs, and principles into a meaningful and manageable form, allowing for the understanding of a phenomenon and the ability to make predictions. A more detailed discussion of theory can be found in, for example, Cohen and Manion, (1994), Neuman (2003), and Glaser (1978; 1992; 1993; 1994; 1995; 1996; 1998; 2001; 2003; 2005a). These references have been used for the discussion below.

2.4.1 Aspects of theory

Concepts are the building blocks of theory. They are concrete or abstract ideas that are represented by symbols or words and are usually created from personal experience, creative thought or observation. Concepts can be simple, or form a higher abstraction from a combination of a set of simpler concepts, forming an increasing hierarchy of abstraction.

Relationships are the glue that binds concepts together and specify the way concepts relate to each other. Theories often take the form of causal statements where a change in one concept exerts an influence on another concept. Strauss and Corbin’s grounded theory (1990), for instance, only considers causal relationships.

Glaser (1978; 1992; 1998; 2005a) maintains that theory extends beyond merely causal relationships and suggests the application of many different types of relationship (theoretical codes) when generating theory. These codes are abstract models that allow the researcher to relate concepts to “interrelated, multivariate hypotheses” (Glaser, 1998:163). Knowledge of these codes sensitises theoreticians to alternative ways of building relationships in their theory. The theoretical codes suggested by Glaser (1978; 1998; 2005a) include, for example,
interaction (variables that interact but one cannot identify which one comes first nor does it matter); dimension (dividing up the whole); units (where the phenomenon in the theory takes place, e.g. nation or organisation); unit identity (people develop an identity with a unit); degree (e.g. identified by limit, range or intensity); and paired opposite (e.g. ingroup-outgroup (in-out), normative-comparative, or inductive-deductive). A more detailed description can be found in Glaser's books (1978, 1998, 2005a).

2.4.2 Properties of theories

Direction of theorising: In deductive theorising the researcher starts with an abstract, logical relationship between concepts and verifies it with concrete empirical evidence. Inductive theorising starts with detailed observations of the world and moves towards more abstract generalisations and ideas.

Level: Micro-level theory deals with small slices of time, space, or number of people. Meso-level theory operates at an intermediate level, for example organisations, social movements or communities. Macro-level theory is concerned with the operation of larger aggregates such as social institutions, entire cultural systems and whole societies. The concepts become more abstract as the levels widen.

Focus: Theory is defined as substantive if it focuses on a specific area of social concern, or as formal when the theory is applicable to a broad conceptual area. Theoretical frameworks include many formal and substantive theories and are an overarching framework within which the theories share assumptions and major concepts.

Changeability: Theory should not be seen as remaining fixed over time; it is provisional and open to revision. As more research is done and more knowledge is generated, theory grows into more accurate and comprehensive explanations about the make-up and operation of the social world (Cohen & Manion, 1994). Glaser and Strauss (1967) regard theory as being “in process”; it is ever-
developing and not a perfect product. Whenever theory is reported on it is assumed to be a momentary product.

2.4.3 Canons for judging theory quality

Glaser and Strauss (1967) and Glaser (2001) recommend that different criteria should be used to judge the quality of generated theory as opposed to those used in positivist research or qualitative data analysis (QDA). Such criteria include fit (does the theory fit reality in the eyes of the subjects, practitioners and researchers in the area); work (does the theory explain the major variations in behaviour in the area with respect to the major concerns of the subjects); relevance (if the theory fits and works it has relevance); and modifiability (theory can be modified if new data warrant modification). A good theory can be used to explain, understand, interpret and predict.

According to Whetten (1989), in his discussion on what constitutes a theoretical contribution, the following four elements need to be considered:

- **What?** The factors (variables, constructs, concepts) that should be considered as part of the explanation of a social or individual phenomenon need to be judged by comprehensiveness and parsimony.

- **How?** Description of how the factors are related. Although Whetten limits the “How?” question to causal relationships, those advocated by Glaser above should be included where applicable.

- **Why?** Explanation of the underlying psychological, economic, or social dynamics underlying the choice of factors and proposed relationships.

- **Who, where and when?** They add the limitations to the relationships generated, as they set the boundaries of generalisability, therefore setting the scope.

Cohen and Manion (1994) contend that a good theory, over and above being parsimonious (the simpler the better), should allow for deductions that can be
tested empirically. Further testing will confirm validity, or may result in a replacement of the original theory by a more adequate theory (supports the importance of Glaser’s requirement of modifiability).

2.4.4 Theory in this research study

According to Cohen and Manion (1994), educational theory is still at the early stages. This thesis attempts to address this deficit by generating theory in the substantive area of DCLAs, specifically lecturer and student participation.

The theory, discussed in Chapter 7, was developed using the Glaserian grounded theory (GGT) method (Glaser & Strauss, 1967; Glaser, 1978; 1992; 1993; 1994; 1995; 1996; 1998; 2001; 2003; 2005a). Using constant comparison, the method identifies concepts and relationships in the data. By conceptualising right from the start, a level of abstraction is achieved where the theory is independent of time, space and people. After fracturing the descriptive data, the concepts and relationships are woven together again into a storyline with the help of the theoretical codes. The concepts and theoretical codes used in this research study are discussed in the next section where the grounded theory method is presented in more detail.

GGT implies a predominantly inductive approach (Glaser & Strauss, 1967). The theory generated in this thesis lies at the micro-level, dealing with a relatively small slice of time and space and a small number of people. The focus is substantive in the area of participation in DCLAs, although the ability to generalise to another substantive area is briefly considered in Chapter 8. The purpose of the theory is to explain, understand, interpret and predict lecturer and student participation in DCLAs. The theory is limited to the data that were used to generate it; however, with more data the theory could be modified to include further evidence. Future research could empirically verify aspects of the theory generated, but this was not within the scope of this research study.
By following the processes of the GGT method and allowing the theory to emerge from the collected data without forcing and preconception, the theory complies with the criteria of fit, work, relevance and modifiability (Glaser & Strauss, 1967; Glaser, 1978; 1998; 2001). The theory in Chapter 7 covers Whetten’s (1989) “what” and “how” questions, and the philosophical principles underlying the choice of factors and relationships – representing the “why” questions – are addressed in this chapter. The “who”, “where” and “when” questions are determined by the environments the data were generated in (discussed in Chapters 4, 5 and 6). The canons for judging theory will be revisited when this research is self-assessed in Chapter 9.

2.5 Methodology

On a methodological level, the “researcher’s perception of how he can find out about reality or the world” (Schurink, 2001a:240) is addressed. This can be quantitative or qualitative.

Quantitative and qualitative refer to the type of data that are collected, but these are often elevated to a research approach where quantitative is equated with the positivist and qualitative with the anti-positivist approaches in the literature (Schurink, 2001a; De Vos, Schurink & Strydom, 2001). Although quantitative research and positivism are closely related, as are qualitative research and interpretivism, Klein and Myers (1999) point out that they are not synonyms. Qualitative research does not have to be interpretive, but depends on the philosophical assumptions of the researcher. For the same reason, positivism does not have to be quantitative (Straub et al., 2005). Therefore, to give an exact definition for quantitative and qualitative research is difficult. Although the terms are commonly used, there “is a good deal of confusion about their exact meaning” (Mouton & Marais, 1990, in De Vos et al., 2001:15). For this research, the position taken by Leedy (1993, in De Vos et al., 2001:15) is adopted, namely to define quantitative research as methodologies that deal with data that are principally
numerical, and qualitative research methodologies as dealing with data that are principally verbal.

Quantitative data have limitations in social research as numbers are not contextually rich (Straub et al., 2005). Qualitative data are used for their richness, texture and feeling of raw data, allowing for the generation of insights and understanding in a social setting (Neuman, 2003). The limitations of qualitative data, however, are their lack of rigour, large volume, non-linear research path and the increased skills required from the researcher (Strauss & Corbin, 1990; Neuman, 2003). In qualitative research there is greater onus on the researcher to be objective as replication is difficult, if not impossible.

Predominantly qualitative data were used for this research study with some supporting quantitative data that was interpreted for meaning. For grounded theory, however, the argument about qualitative or quantitative data is immaterial as “all is data” (Glaser & Strauss, 1967; Glaser, 1998).

2.6 Research methods

Two of the more prominent research methods identified by Locke (2001) and Avison and Myers (2005) are action research (a change is introduced and the effects observed) and grounded theory (the generation of theory that emerges from the data).

The data collection for the grounded theory in this research study occurred during four action research pre-research cycles using case studies (Thomas & Brown, 2001), the case studies reported in the literature, and two additional case study cycles which followed the action research principles. The researcher was actively involved in executing the DCLAs and, after each cycle, the execution of the DCLA for that cycle was examined, the effects of previous changes noted, new problems identified and changes planned for the next cycle (see Chapters 3, 4, 5 and 6).
The data collected formed the data for the grounded theory application to generate a theory for the main concern of the participants in the DCLAs, namely, lecturer and student participation (see Chapter 7). One of the difficulties experienced in this research study was the confusion caused by the fact that there are two methods, both known as “grounded theory”, namely, the original, also known as the traditional or Glaserian method, developed by Glaser and Strauss (1967) and the Straussian method developed by Strauss and Corbin (1990). Although Strauss and Corbin claim that their method is the same as the Glaserian method, there are subtle but profound differences, which can only be fully understood after an in-depth study of the two methods.

The confusion regarding the two grounded theory methods is widespread in the literature. Many research studies claiming to use grounded theory use it in questionable ways to “cover” for poor and mediocre research, for example, several researchers only use it for content analysis and do not generate theory, which is the aim of using grounded theory (Simmons, 1995; Stern, 1995; Adolph, Hall & Kruchten, 2008; Matavire & Brown, 2008); some researchers do not specify which method was used whilst using the Straussian method (Pandit, 1996; Sarker, Lau & Sahay, 2001; Macrì, Tagliaventi & Bertolotti, 2002; Saunders et al., 2003; Goddard, 2004); some researchers use the Glaserian method without reference to the Straussian method (Pettigrew, 2002; Jones & Kriflik, 2006; Sternquist & Chen, 2006); others mix the methods as if they are the same (Douglas, 2003; Geiger & Turley, 2003; Turley & Geiger, 2006); or claim to use the Glaserian method, but use aspects of the method described by Strauss and Corbin (Ekins, 1997; Goulding, 2002). For example, Pauleen (2001) claims to follow the Glaserian approach for data collection and analysis in his PhD study, but specifies the use of axial coding (specific to the Straussian method) in an article referring to the same study with the same categories identified (Pauleen & Yoong, 2004).

In this research study a great deal of time was wasted in a futile attempt to apply a combination of the two methods, before the antipode by Glaser (1992) to Strauss
and Corbin’s book (1990) was read where Glaser explains the differences. After an in-depth study of the two methods, it was decided to follow the Glaserian grounded theory method in this research study. One outcome of this study in terms of the two grounded theory methods is a paper that highlights the differences and was presented at the 2009 South African Institute for Computer Scientists and Information Technologists (SAICSIT) Conference (Van Niekerk & Roode, 2009).

Owing to the reigning confusion in the literature, and because the approach followed in the GGT method differs substantially from other research methods, it is summarised in sections 2.6.1 and 2.6.2 and the philosophical underpinnings and the adaptations of grounded theory discussed in sections 2.6.3 and 2.6.4 respectively. In conclusion the application of grounded theory in this research is presented in section 2.6.5.

2.6.1 Background to the Glaserian grounded theory (GGT) method

The main aim of grounded theory is to methodically generate theory that is well grounded in the empirical data. The product of this process is a set of concepts grounded in the data that are organised around a core category and integrated into hypotheses representing the relationships. The resulting theory fits the data; it works in that it explains what happened in the research setting and is relevant. By modifying the theory, ongoing relevancy is ensured (Glaser, 1978). Although the product does not, necessarily, provide full coverage, it makes a contribution according to what is done, not what is not done (Glaser, 2005b).

The first book on grounded theory was written by Glaser and Strauss in 1967 after developing the method whilst doing research for their book titled *Awareness of Dying* (Glaser & Strauss, 1965). Their purpose was to define a method that would “improve social scientists’ capacities for generating theory that will be relevant to their research” (Glaser & Strauss, 1967:vii). They wanted to develop canons more suited to the discovery of theory than those used for “vigorous quantitative verification” (Glaser & Strauss, 1967:viii). The generated theory provides the
researcher with the power to predict, explain, interpret and apply (Glaser & Strauss, 1967).

For GGT the researcher needs conceptual skills to enable him/her to “absorb the data as data, to be able to step back or distance oneself from it, and then to abstractly conceptualize the data ... If the researcher is admittedly low on conceptual ability, then he or she should not try grounded theory” (Glaser, 1992:12). Basic rules are given, but there are no guarantees that the researcher will end up with a theory, as this depends largely on the researcher and his/her conceptualisation skills. This need for conceptualisation is the reason why researchers new to GGT experience difficulty in trying to apply the method. This is exacerbated by the lack of access to experienced grounded theory mentors (to this day, still in short supply).

In a follow-up book, Glaser (1978) elaborated on the method with knowledge gained whilst teaching students and applying the method in research. Strauss and Corbin (Strauss, 1987; Strauss & Corbin, 1990) tried to make the method more accessible to researchers new to grounded theory with two books in which they introduced a more formalised process. Although claiming that it was the same as the original grounded theory method, they had deviated from the essence of the original method to such an extent that they had created a new method; unfortunately also calling it “grounded theory”. The fact that Strauss, as one of the co-authors of the original book on grounded theory (Glaser & Strauss, 1967), as well as three application books (Glaser & Strauss, 1965; 1968; 1971), still after twenty years did not understand the essence of the grounded theory method, attests to the difficulty of learning to apply this method correctly. Glaser replied in 1992 with an antipode to Strauss and Corbin’s book (1990) and requested them to rename their method, as it produces, according to him, “a forced, preconceived, full conceptual description” (Glaser, 1992:3), which is not “grounded theory”. Glaser has since written numerous books and published many grounded theory research readers (Glaser, 1993; 1994; 1995; 1996; 1998; 2001; 2003; 2005a). He
also runs the Grounded Theory Institute, and presents troubleshooting seminars for PhD students worldwide to make the grounded theory method more accessible to researchers. In October 2006, I was fortunate to be able to attend one of these seminars in New York.


In a nutshell, the GGT method consists of taking the data collected in a substantive area under investigation apart, discovering patterns latent in the data, and putting the story together again around these patterns.

The researcher starts by collecting initial data that are relevant to the concerns of subjects in a substantive area. The data that are collected may consist of observations, interviews with the subjects, any other form of data collected during the research project or secondary data gathered for another purpose. Furthermore, the data can be baseline, vague, or interpreted and can be in the form of, for example, qualitative data, quantitative data, pictures and/or diagrams. Glaser repeatedly states in his books that “[a]ll is data” and is incorporated as such into the theory.

Contrary to traditional research where the research question is formulated before the start of the research, the researcher in GGT does not start with a research question, but with a substantive area where the participants have concerns that need to be understood and resolved. The researcher allows these concerns to emerge from the initially collected data. It is important that the reading of literature in the substantive area is left until after the concepts (categories) and relationships have emerged from the data. This is done to ensure that the researcher, on entering the research area, does not have preconceived ideas, but stays open to the theory that emerges from the data. If the researcher comes to the research with preconceived ideas, s/he might follow the ideas and miss the actual problem
that emerges. The theory will then not be emergent and not grounded in the data, but will be based on the verification of preconceptions.

After the emergence of the concepts and relationships, the researcher reads extensively and treats the literature as another source of data to be integrated into the emerging theory. This is contrary to traditional research methods where a literature study in the substantive area is done before the start of the research. A third aspect that is contrary to traditional research is that coding and analysis start as soon as possible after the first data are collected and run parallel to, and guide, further data collection. As with the research question and the literature study, in traditional research the data collection is defined before the start of the research.

After the first data are collected an open coding approach is followed. The data are opened up by analysing line by line and writing down any concepts that emerge. These concepts have to be on a conceptual level and must not be definitions of the data but identify latent patterns in the data. The aim of grounded theory is “not findings, not accurate fact and not description. It is just straightforward conceptualisation integrated into theory – a set of plausible, grounded hypotheses. It is just that – no more – and is readily modifiable as new data come from whatever source” (Glaser & Holton, 2004:8). The researcher tries to answer questions related to what the data are a study of; what concept (also referred to as code or category) the incident indicates; what is happening in the data; what the main concerns of the subjects are; and how they address these concerns. These questions force the researcher to stay focused on the underlying patterns that yield the concepts thereby transcending the data. The result of this conceptualisation is a theory that is abstracted from time, place and people.

In the beginning incidents are compared to other incidents to identify the underlying similarities, differences and conditions. The similarities are formed into categories, the differences are formed into the properties of the categories, and the conditions are formed into the hypotheses. As soon as the categories emerge,
incidents are also compared to the categories. New properties and hypotheses are generated with the aim of theoretical elaboration, saturating the categories, the densification of categories by developing the properties, and creating new categories. Finally, categories are compared to categories, and as many categories as possible are identified in this step. By means of conceptualisation, the categories are not bound to the specifics in the data, but allow for the interchangeability of incidents to ensure that the categories can be saturated. This interchangeability also ensures that a theory is produced that can be transferred to other substantive areas by linking it to incidents in the new area that will produce the same categories and properties.

The researcher needs to be able to keep an analytical distance and tolerate confusion and regression whilst staying open and trusting to conceptual emergence. S/he must be able to conceptualise, organise, make abstract connections, visualise and think in terms of multi-variables. The researcher must also have the ability to develop theoretical insights into the research area. Owing to conceptualisation, the coding cannot be done by a computer as it requires an abstract reasoning process and, although certain steps and procedures are followed, no recipe for conceptualisation exists for this discovery. The lack of recipes makes this step highly creative, but also very difficult to master for a researcher who is new to grounded theory.

From the moment the first data analysis is done, the researcher starts writing memos. These are records of the concepts in the data and their properties; the relationships between the concepts and their properties as they are discovered in the data; and thoughts and ideas pertaining to the research as they occur to the researcher whilst analysing the data. These thoughts and ideas could happen at any time, therefore a recording medium that is constantly available is preferred, for example cards that can be carried around in the pocket, or a piece of paper. The memos do not have to conform to any specific rules; the only requirement is that
they are written so that they are highly sortable for when they are used to compile the storyline at a later stage.

While the researcher is busy comparing incidents and categories, a core category emerges. This category is one that seems to account for most of the variation in the subjects’ concerns and that also relates to the original focus of the research: it is central and relates to as many other categories and their properties as possible. As the core category’s function is to integrate the generated theory, the succeeding data collection and coding changes to selective coding and theoretical sampling where only the data that relates to the core are collected and coded (this ensures that the emerging theory is parsimonious). This cannot be specified in advance and is totally dependent on what emerges after the previous data collection and analysis. The researcher can now focus on this core category and limit the collection and coding of new data, saving time and money. It is therefore advisable for the researcher to try and identify the core category as soon as possible by saturating the emerging categories that seem to have the most explanatory power. If more than one category complies with the requirements of a core category, only one is chosen for the research study, and the others can be developed into other research studies (as was done by Glaser and Strauss in their first two grounded theory studies [1965, 1968]).

Gaps in the saturation of categories, their properties and the emerging theory are filled by more and more selective choices of where and what data to collect next. Selective coding ceases when the core category, its properties and theoretical relationships have been saturated, that is, no new information is discovered regardless of what new data are collected. This is seen as one of the advantages of grounded theory in that the amount of data is contained and does not run into uncontrollable volumes as often happens in QDA. It allows the researcher to focus on the issues under consideration without getting bogged down by the data.
When the researcher uses secondary data a similar method is followed. At first the researcher codes from a subsection of the collected data, analyses it and then becomes more and more selective in what data are considered for coding and analysis. If gaps exist the researcher can consider any further data as s/he deems necessary – newly collected or secondary. This flexibility forms part of the appeal of GGT.

After saturating the categories, the researcher looks for possible reductions by grouping similar categories and their properties into higher level categories. The theory now becomes delimited and focused.

Throughout the process the researcher creates memos that capture the emergent ideation of substantive and theoretical categories. The relevant literature is added and the memos are now reviewed, sorted and integrated into the core category. Sorting puts the fractured data together again and forms the outline of the theory. At this stage, the researcher must be careful not to sort according to a preconceived outline, but to let the framework emerge. During sorting more memos are generated which are re-sorted into the outline and these memos are usually on a higher conceptual level than before. A continual process of sorting and memoing allows the researcher to eliminate excesses and to concentrate on a parsimonious set of integrated concepts. The aim is to explain “with the fewest possible concepts and with the greatest possible scope, as much variation as possible in the behaviour and problem under study” (Glaser & Holton, 2004:15). This process is highly creative prohibiting the researcher, once again, from handing it over to a computer program.

The decision on where to position a particular memo with regard to similarities, connections and underlying uniformities is based on the emerging theoretical codes (see section 2.4). “Theoretical codes conceptualize how the substantive codes of a research may relate to each other as hypotheses to be integrated into a theory … They weave the fractured story back together again” (Glaser, 2005a:2).
One, or a combination of a few theoretical codes, becomes the dominant emergent code for the write-up. As the researcher has to recognise the appropriate theoretical codes when they emerge during sorting, it is important that s/he has a good working knowledge of as many theoretical codes as possible. Glaser does warn, however, that the codes are hard to understand in the beginning and need studying. Often a researcher feels comfortable with one of the codes and subsequently tries to force all further research into these “pet codes” such as the causal model, for example. Researchers new to grounded theory have found this to be the most difficult step. I can confirm this from my own experience with this research study.

2.6.3 Philosophical underpinnings of the GGT method

There are several arguments about where grounded theory fits into the map of research philosophies and methodologies; despite the fact that Glaser constantly reiterates that it is only a method with no connections to any philosophies (Glaser 1992; 1998; 2001; 2003). Although grounded theory is often used with qualitative data, it is not limited to qualitative data. Quantitative data, graphics and pictures can also form part of the data, as “all is data” and all data have latent patterns (Glaser 1998; 2003; 2005). Glaser recently devoted an entire book to Doing quantitative grounded theory (2008). As he says, the grounded theory method can “use any data and any data in any way and in any combination” (Glaser, 2003:99).

In his books, Glaser goes to great lengths to describe the differences between GGT (theory generated at a conceptual level and abstract in terms of time, place and people) and QDA (concerned with accurate description). He devoted an entire book, The Grounded Theory Perspective: Conceptualization Contrasted with Description (2001) to clarify this misconception.

Glaser devotes a chapter (Chapter 11) in his book The Grounded Theory Perspective II: Description’s Remodeling of Grounded Theory Methodology (2003) to a discussion of Kathy Charmaz’s proposed constructivist grounded theory
(2000). In constructivism the existence of multiple social realities requires that the accuracy of the interpretation of interview data is assured through a mutual interpretation by the interviewer and the interviewee. Glaser claims that: “Constructivist grounded theory is a misnomer. Grounded theory can use any data.” He reiterates constantly in his books that “[t]he product, a grounded theory, will be an abstraction from time, place, and people that frees the researcher from the tyranny of normal distortion by humans trying to do accurate description to solve the worrisome accuracy problem … Action frees the researcher from data worry and data doubts, and puts the focus on concepts that fit and are relevant” (Glaser, 2003:167).

GGT is not concerned that the data might not be accurate, as conceptualisation and “the constant comparative process reveals these biases” (Glaser, 2003:170) and it becomes another variable to consider in the theory.

Similar criticism can be levelled at the attempt by Lincoln and Guba (1985, in Glaser [2003]) to remodel grounded theory in their discussion located in the postpositivist/constructivist view. They also focus on “truth”, “trustworthy data”, and “accuracy”, and Glaser contends that “its [referring to the book Naturalist Inquiry by Lincoln and Guba] application to grounded theory has been a major block on grounded theory, as originated, by its cooptation and corruption hence remodelling grounded theory by default” (Glaser, 2003:181). Glaser discusses this in Chapter 12 in his book The Grounded Theory Perspective II: Description’s Remodeling of Grounded Theory Methodology (2003).

In a debate spanning three papers, Bryant (2002a; 2002b) and Urquhart (2002) argue whether grounded theory can be seen as being positivist or not. The problem in pinpointing the exact philosophy is aptly demonstrated by Urquhart (2002) in that she calls grounded theory “paradoxical”, as it analyses the data in an interpretive way; however, it is also a systematic way of generating theory (positivist). It can, however, be argued just how systematic the generation of
theory is. As may be seen from the brief discussion on grounded theory above, the generation of concepts is highly creative and is not bound by recipes, even though it is systematically generated from the data. This accounts for the phenomenon experienced by Madill, Jordan and Shirley (2000) where they showed in an experiment that the categories generated by two researchers using the same data were different and that the degree of “subjectivity” depended on the philosophical position of the researcher. Urquhart gives examples of grounded theory Information Systems studies that have either been done in an interpretive context or in a positivist context. This leads her to conclude that, as long as the researcher is clear about his/her own philosophy, grounded theory can be located in any paradigm as a way of analysing data.

2.6.4 Adaptations of grounded theory

Babchuk (1996) studied the use of grounded theory in adult education research. The study covered 15 years (1979–1996) of research papers in several journals and conference proceedings. Grounded theory was used in a wide range of problem areas and practice settings within the area, but the research indicated “that grounded theory has been viewed by scholars and practitioners in education and adult education as an umbrella term which encompasses an entire spectrum of procedures and practices seen as falling under the domain of this methodology” (Babchuk, 1996:4). The applications varied from using a subsection of the grounded theory techniques to combining grounded theory with another method. In a more recent article, Matavire and Brown (2008) investigated the grounded theory approach that was used in 97 research papers published between 2001 and 2007 in 30 different Information Systems-centric journals. They found that 67% only used the analysis techniques, 17% used the Straussian method, 5% the Glaserian method and 13% mixed methods.

One of the mixed methods that has a bearing on this research study is the grounded action research of Baskerville and Pries-Heje (1999). They integrated
techniques from the Straussian grounded theory method into an action research cycle. Their aim was to add rigour and reliability to the theory formulation process in action research by adding some of the grounded theory techniques. According to them the role of theory in action research is to use existing theory in the beginning to plan action, and then to reinforce, withdraw or modify the theory after each cycle as new insight is gained. Grounded action research was extended by Pauleen (2001) to grounded action learning by applying grounded action research to a virtual team facilitation training programme (Pauleen, 2001; Pauleen & Yoong, 2004).

Adapting GGT is a contentious issue. Glaser’s concern when other QDA methods are mixed with GGT is that such changes remodel GGT into yet another QDA method “with all its descriptive baggage” and “default modelling to QDA canons and techniques” (Glaser & Holton, 2004:2) that grounded theory has steered away from. He contends that as soon as the GGT method is linked to other approaches it complicates the method and places blocks on the researcher to the detriment of the resulting theory (Glaser 1998; 2003; 2005). Glaser further maintains that grounded theory is a complete method and “a set of integrated conceptual hypotheses systematically generated to produce an inductive theory about a substantive area”, and that “[i]ts data collection and analysis procedures are explicit and the pacing of these procedures is, at once, simultaneous, sequential, subsequent, scheduled and serendipitous, forming an integrated methodological ‘whole’ that enables the emergence of conceptual theory as distinct from the thematic analysis characteristic of QDA research” (Glaser & Holton, 2004:2–3). Therefore, subsections of the method cannot be used and the method cannot be mixed with other methods.
2.6.5 Grounded theory in this research

Motivation for using grounded theory

The occurrences in the four pre-research cycles and the experiences related by other researchers in the literature indicate that the factors affecting participation in DCLAs are numerous, each having a wide range of possible values. These factors are closely interlinked, as changes that were made to one factor in the pre-research DCLAs affected several others. Each execution of a DCLA is, therefore, uniquely determined by the factors and their values.

The grounded theory method is applicable to this scenario as its aim is to generate conceptual theory that is abstract in terms of time, place and people (Glaser, 2001). “The goal of GT is to arrive at at least the third level of conceptual analysis. First in collecting the data, then generating categories, then discovering a core category which organizes the other categories by continually resolving the main concern” (Glaser, 2001:19). As Glaser states, “[c]areers in description go on forever as descriptions can go on and on. Careers in conceptualization are short, since a conceptualization of a field can be wrapped up in ten properties of a category and there is nothing more to say” (Glaser, 2001:30). Biases in the data, resulting from my close involvement in participating in three of the four pre-research cycles and coordinating the final two cycles, are not seen as a limitation because in GGT “all is data”.

A conceptual theory on participation would add value to the existing body of knowledge by explaining, understanding, interpreting and predicting participation in DCLAs. To my knowledge no other theory for participation in DCLAs has been developed.

Motivation for using the GGT method

The decision to use the Glaserian grounded theory method in this research study was taken after some futile attempts to apply a combined approach of the
Glaserian and Straussian grounded theory methods, thinking that they described
the same method as contended by Strauss and Corbin (1990). I also experienced
some of the problems Strauss and Corbin (1990) admit to in their book: for
example a long list of codes which, even after categorisation on higher levels of
abstraction could not cope with all the relationships that existed between them and
their dimensions; and the constant questioning of each incident and the need for
the researcher to create hypothetical answers that have to be verified in the data.
These problems are not relevant to the Glaserian approach with its early
conceptualisation, emergence from the data (not preconception), quick
identification of the core category, and delimitation of the theory to the concern of
the participants and the core category.

Adapted versions

In the four pre-research DCLA cycles the action research method was followed
(Thomas & Brown, 2001). This is a popular research method in education where
teachers (who are often also the researchers) are an integral part of the research
setting and are not independent bystanders. They try to solve a problem quickly,
obtain feedback, apply changes and repeat the cycle in a spiral of planning, acting,
observing and reflecting (Bryant, 1996; Avison & Myers, 2005). I coordinated two
additional DCLA cycles following action research principles. This would justify
using the grounded action research method developed by Baskerville and Pries-
Heje (1999), or the extended grounded action learning method used by Pauleen

After several attempts this proved to be impossible for the same reasons warned
against by Glaser on mixing QDA methods with GGT (Glaser, 2001). The methods
developed by Baskerville and Pries-Heje (1999) and Pauleen (2001) were based
on the Straussian and not the Glaserian grounded theory method. On the
recommendation of Dr Barney Glaser at the grounded theory seminar in New York
(Oct, 2006), the action research cycles and the application of the GGT method
were considered as two separate consecutive phases in this research study. The data collected during the pre-research and the two additional action research type cycles, together with the literature, were used as secondary data for the GGT method, which was executed in a separate step after data collection. GGT can be applied to secondary data as “all is data” in grounded theory and the volume of data collected was found to be enough for theory saturation.

Reservations

Some reservations existed with regard to the application of the GGT method in this study. Although the reservations were real and did complicate the GGT phase, I did not feel that they outweighed the advantages to such an extent that it warranted discarding the GGT method in favour of other QDA methods. The first concern was my inexperience with the method and my lack of access to an experienced GGT mentor. The danger also exists that people who are weak in conceptualisation tend to use a few preconceived concepts and revert back to description (Glaser, 2001). The lack of GGT mentors is referred to by Glaser (1998) as minus-mentoring and is a problem worldwide. When I started I was not aware of just how difficult the GGT method is for a researcher new to grounded theory. The realisation came at the same time as learning how to apply the method. This resulted in a substantial amount of time spent on trial and error and prolonged the time period for this research study.

A second reservation was that my data had already been generated during the DCLA cycles. Although secondary data can be used, the possibility exists of gaps that have to be filled by additional theoretical sampling. The data that were collected for this research study, including the literature, proved to be rich and adequate for theory saturation. The literature research was extended beyond the field of DCLAs to include co-located collaborative learning, co-located teaming and industry virtual teaming (last two not reported on in the literature chapter, Chapter 3, due to the length limitations of the thesis).
The final reservation was that I did not start the GGT study *tabula rasa* (i.e. without an in-depth literature study and knowledge of the DCLA field). The initial literature review occurred, though, after the four pre-research cycles and after the main concern of participation had been identified, but before and during the additional two DCLA cycles and before the start of the GGT study. One of the strong dictates of grounded theory is that the literature study in the substantive field is delayed until after the categories have emerged; the danger being that the researcher will not be open and free to discover the emergence of concepts, problems and interpretations from the data (Glaser, 1998). This could not be avoided in this research study, but, as no theory for participation was found in the literature and participation was identified as a major concern of the participants before the literature study, the impact on the PCR theory generation was limited.

*Use of the GGT method in related research areas in the literature*

Two researchers who used the full GGT as research method in their PhD theses in fields related to DCLAs are Fernández (2003), who investigated metateams and identified *constant discovery and resolution of conflict* as the core category, and Scott (2007), who investigated the integration of online studies into the adult student’s life and identified her core category as *temporal integration* which centres on the way students make time for their studies among their other commitments. These two categories were not dominant in this research study, but formed part of two of the non-core categories.Straussian grounded theory and adapted grounded theory methods have been used in virtual team research by authors such as Nemiro (2000), Wilson (2000), Pauleen (2001), Sarker *et al.* (2001), Rennecker (2002), Ojasalo (2004), Qureshi *et al.* (2004), and Zhang (2005).

*The categories and the core category identified for this research*

In a multi-campus environment, DCLAs cannot be executed without course module lecturer participation on all the campuses. Furthermore, student
participation is important in an action learning environment, as learning occurs during participation and for every student who does not participate in a team, the learning and teaming experiences of the other students in the team are negatively affected. In a DCLA, ensuring lecturer and student participation is, therefore, a major concern for the coordinator, lecturers, students and other stakeholders such as the faculty members (collectively referred to as stakeholders in this research study).

Participation can be ensured as long as the stakeholder feels that participation is beneficial to him/her. In other words, as long as the assignment is worthwhile and the perceived rewards of participating outweigh the perceived costs. The core concern that soon emerged from the data, therefore, was how costs and rewards are continually resolved by the participants, which led to the core category of perceived costs and rewards. This category proved to account for most of the variation in the participants’ concerns, was central and was related to the other categories and their properties. The other categories that emerged were task characteristics (e.g. a structured task reduced the time needed for teaming), self (e.g. commitment level), the value of time (e.g. when students had to learn for a test their time was more valuable than at other times), uncertainty (e.g. students did not know their team members, but had to rely on them for their marks), expectations (e.g. unrealised expectations of fellow team members’ work ethics could carry a high cost), fairness (e.g. free-riders receiving team marks), and finally the impact of teaming with the other stakeholders (e.g. conflict).

Whilst sorting the memos several theoretical codes emerged. For example, the participants employed strategies for reducing the perceived costs and increasing rewards and this continued until a cutting-point was reached where the perceived costs outweighed the rewards and the lecturer/student made a decision to stop participating. The dominant theoretical code that emerged, though, and that was used to weave the theory together (see Chapter 7) was the causal theoretical
code. For example, the value of time affected the perceived costs and rewards and uncertainty increased the perceived costs.

The data were rich and several more grounded theory studies could be carried out on the data by considering different concerns, a different core category and different theoretical codes. This is, however, outside the scope of this thesis but could be used to write future research papers.

2.7 Data collection

For GGT “all is data”. This means that “exactly what is going on in the research scene is the data, whatever the source, whether interview, observations, documents … It is not just what is being, how it is being and the conditions of its being told, but all the data surrounding what is being told” (Glaser, 2001:145). The data can be baseline, proper-line, vague, interpreted or conceptual, and can be qualitative and/or quantitative in nature. Several types of data were collected during the six DCLA cycles for the GGT analysis in this research study, namely, post-mortem reflections, observations, interviews, questionnaires and computer records. They are discussed in more detail in sections 2.7.1 to 2.7.7 below.

2.7.1 Data triangulation

Different types of data triangulation (Cohen & Manion, 1994) were used, namely, cross-sectional time triangulation where data were collected from different groups at one point in time (each DCLA execution had at least ten teams participating); space triangulation where data were gathered from different cultural settings (small satellite campus versus large main campus); combined levels where data were collected from an individual level and a group level (individual post-mortem reflections versus sub-group and class-group interviews); and methodological triangulation where different data collection techniques were used on the same objects of study (post-mortem reflections, deliverables, surveys, tests).
2.7.2 Post-mortem reflections (Cohen & Manion, 1994)

After each of the two additional DCLA cycles executed for this research study, the students had to write a post-mortem reflection. These reflections formed the largest percentage of the data collected. They were open-ended and the students had to reflect on their personal experiences, their own learning, the problems experienced, how these problems were addressed, the success/failure of the approaches used and possible improvements they could suggest for future DCLAs. These documents formed part of the learning experience as it is good practice in the ICT industry to reflect and critique experiences after the completion of each ICT project. The students received individual marks for these documents and were warned that the reflections would be marked on insights gained, whether positive or negative, and that they would not receive marks if they tried to “sugar coat” their experiences by writing what they thought I would like to hear. To encourage them to be honest, they were informed that they could expect to encounter difficulties during the execution of the DCLA and that this was part of the learning experience. To limit possible biases the post-mortem reflections had to be written before the students received their results for the other deliverables. The students were also given the assurance that the reflections would only be read after the other deliverables had been marked and were for my eyes only – only summaries would be published.

The value of the reflections for me was that I received an insider’s account of the students’ experiences of the DCLA. In an online distributed environment the ability to observe teaming is very limited. I took into account the fact that personal reflections contain biases as they are tainted by the student’s own perception of his/her experience. The reflections were collated per team and cross-checked for inconsistencies. My perception was that the reflections were remarkably honest and generally of a high standard. Students were not afraid to criticise the DCLAs and seemed to relish the opportunity to report on their experiences and be able to voice their own opinions.
No reflections were available for the four pre-research cycles, but 49 out of 63 students handed in reflections in the first additional DCLA and 52 out of 60 students in the second DCLA cycle. The reflections were labelled for reference as follows: a number 1 or 2 to indicate the additional DCLA cycle number, PE or G to indicate the campus, the team’s number, and a unique number assigned by me to each student. For example, 1G5-23 indicates the first cycle, a George Campus student in team 5 with the unique student number 23. A few examples of post-mortem reflections are given in Addendum A.

2.7.3 Observation (Neuman, 2003; Schurink, 2001b; Bentley & Whitten, 2007)

Most of the interaction in a DCLA occurs online, minimising opportunities for observation. The students could work “anytime and anywhere” in the virtual environment. In this research study I made limited observations whilst students were working on the DCLAs during class time at my own campus. I could not take extensive notes, but summarised relevant aspects after the class in the two additional DCLA cycles. My presence had a minimal effect on the way the students conducted themselves with regards to the DCLA as I was known to them and I was their lecturer for the course module in three of the five cycles I was involved in.

2.7.4 Interviews (Cohen & Manion, 1994; Scott, 1996; Schurink, Schurink, & Poggenpoel, 2001; Schurink, 2001c; Neuman, 2003; Saunders et al., 2003; Bentley & Whitten, 2007; Myers & Newman, 2007)

Interviews are commonly used in interpretive research studies to explore, describe and/or explain and can be structured, semi-structured or unstructured. An interview can be personal in a one-on-one setting, or it can be one-to-many, as in focus groups. In this research the interviews at my own campus were unstructured and one-on-one and one-on-subteam on an ad hoc basis when students were experiencing problems. They were not recorded, but summarised afterwards. The disadvantages of interviews, such as the Hawthorne effect (interviewer is a
stranger and can change people’s behaviour), were minimised in that I was part of the DCLAs and not an intruding stranger and was known to my own students from past courses that I had lectured.

Focus group interviews were conducted during debriefing sessions, one on each campus after the first additional DCLA cycle, and one on my own campus after the second additional DCLA cycle. Focus groups enhance discussions among members, but are also limiting in that not all members feel free to express their views. This was experienced during the debriefing sessions as the more vocal and dominant students tended to take over the discussions. The classes were too large and the time was too limited to prevent this. The discussions were not recorded and transcribed, but the main concerns of the students were summarised on the lecture room’s whiteboard during the discussions.

2.7.5 Questionnaires (Fouché, 2001; Neuman, 2003; Saunders et al., 2003)

Questionnaires are mainly viewed as a quantitative data collection method used in surveys; however, a combination of well-planned questions can add insight to a qualitative research study.

In my research, in order to funnel down and arrive at a better understanding of the students’ general feelings on specific aspects of the DCLA, a questionnaire was administered after the second additional DCLA. The students were asked to give their opinion on eight open-ended and 58 closed Likert-scale questions (1 – do not agree, 5 – fully agree). In addition the students were asked to answer four open-ended questions in the peer review. The answers to the open-ended questions were grouped for qualitative data, and the answers to the scaled questions entered into a grid and summarised into quantitative data (see Addendum B for a summary of the quantitative data).

The questionnaire was not my main source of data, so I set it up myself and did not have it validated. I kept the questions short and to the point; let the topics flow logically to prevent confusion and leading questions; and kept the layout simple
with the Likert-scale questions grouped together, followed by the grouped open-ended questions. The questionnaire was compiled in the form of a Word document and was emailed to the students who filled in the questionnaire at the university and emailed it back to me. This had its drawbacks, as the questionnaires were not anonymous and could, therefore, contain biases. The students had to fill in the questionnaire before they received their marks, but were reassured that the questionnaire would be analysed after all the other marking had been done. Although the students did complain about the length of the questionnaire, a relatively high number, that is, 43 out of 60 questionnaires were returned.

The questionnaires were grouped per team to determine consistency with the questionnaires of the other team members and the post-mortem reflections. As far as I could determine the questionnaires were mostly consistent with the other data. The danger exists that students could invent answers, especially if they had not participated (this was minimised in this research as all but one student participated in this cycle). Where the questionnaires did not enable the clarification of questions, probing for more information and the interpretation of body language, the other data collection methods compensated.

2.7.6 Computer records

Research data can be extracted from computer records and records of student communication. The monitoring of students’ communication is possible in an online environment, and has been done by several authors in the literature (e.g. Scott, Cramton, Gauvin, Lobert, Steinke & Patterson (1997); Olson-Buchanan et al. [2007]). It has its drawbacks, however, as it limits the online communication tools that can be used for communication; can affect communication as students do not necessarily have continued access to the tools; not all students communicate spontaneously if a lecturer has access to the communication; when there is more than one student in a subgroup on the same campus face-to-face communication takes place and one of the students tends to communicate online
with the other members; and the volume of communication is large and requires a substantial amount of lecturer time. To keep student communications spontaneous and lecturer costs minimised in this research study communication was not monitored.

A copy of online lecturer communication, online documents that were shared and online researcher–student communication was saved for this research. These data formed a small section of the data collected for the two additional DCLAs, but were the only data, apart from my own experiences, available from the pre-research. See Addendum C for examples of online communication.

2.7.7 Additional data

Additional data were collected in the form of the individual and team task deliverables, the assessment marks and feedback. These were augmented with each student’s course module mark and performance history, which gave me added insight into the individual student’s reasons for participating, such as general commitment towards the course module.

At the end of the second additional DCLA cycle each student had to write a 30-minute test. This had several aims: firstly, it tested the students’ knowledge of the task topic and the virtual teaming skills learnt, indicating to the lecturers the success of the DCLA as a learning tool; secondly, it was an incentive for the students to participate, as the knowledge tested was related to their experience in the virtual teams; thirdly, it reinforced virtual teaming aspects; fourthly, it increased the individual marks component; and lastly, the test results could be added to the data collected for the research. The test is included in Addendum D.

The final data collected were the peer assessments where the students had to rate their team members’ participation and commitment. The lack of ability to observe commitment online caused the peer assessment to be biased so these data were discarded apart from noting that the peer assessment was unusable. In the second additional cycle the students had to answer a few open-ended questions on team
management in their teams on their peer assessment forms. Their answers were collated per team and added to the other collected data. An example of a peer assessment for the second additional DCLA cycle is included in Addendum D.

2.8 Conclusion

In this chapter the philosophical underpinning of this research study, the research dimensions, aspects of theory, the methodology, the research methods (mainly GGT) and the data collection observed during this research study were discussed briefly. The literature on DCLAs formed part of the data collected for the theory developed in Chapter 7. The literature study on DCLAs is described in the next chapter (Chapter 3) and is followed by a description of the pre-research and the two additional DCLAs cycles that were carried out in the quest to make it worthwhile for lecturers and students to learn about virtual teaming (see Chapters 4, 5 and 6).
Chapter 3

Literature Review

3.1 Introduction

The advent of computer networks and communications software, as well as the merging of companies worldwide, the proximity of the global village, working 24/7, working from home and the availability/non-availability of expertise have seen teams moving their borders from propinquity to virtuality. This shift has been so profound that Arnison and Miller (2002 p166) feel that “it may not be practical any more to draw a distinction between conventional face-to-face teams and virtual teams due to the invasive nature of technology throughout most modern organisations”. Even conventional team members take advantage of technology, such as emails to exchange information and files.

Tom Peters (2003), in his highly acclaimed book *Re-imagine*, talks about the shift from a white-collar worker to a Web proficient worker, which requires a paradigm shift in the ways we conduct our work. The worker will be required to participate in several teams at the same time: one will often be with immediate co-workers, but others may involve members across departments, organisations, customers and other supply and demand chain employees. Several of these teams will be virtual with members scattered across buildings, towns and the globe. These members can work in different time zones, functions, organisations and nations (Hellriegel, Jackson, Slocum, Staude, Amos, Klopper, Louw, & Oosthuizen, 2001; Duarte & Snyder, 2000). Information technology (IT) projects, with their need for a close relationship with the project’s users and stakeholders, the need for scarce expertise, as well as their technology adeptness, have been the natural forerunners of virtual teaming (Lipnack & Stamps, 2000). As Lipnack and Stamps (2000:xxvii) state: “With the net and the web, practice explodes and now drives
theory toward a new science of human interaction”. Tertiary education institutions have recognised the value of virtual teaming assignments combined with collaborative learning to form distributed collaborative learning assignments (DCLAs).

Often the DCLAs have been found to be more difficult to execute, however, than anticipated. This is ascribed to the many factors that affect them. These factors can take on many values and forms and the interrelationships among them are numerous and complex, making each DCLA that is executed unique with unique outcomes (McFadzean & McKenzie, 2001; Nash, Plugge & Eurelings, 2001; Häkkinen, 2004). This poses a limitation for DCLA research in the dependence of the research findings on the research setting. Only four of the more than sixty research items investigated for this thesis report wider than one specific scenario (Bailey and Luetkehans, 1998; Nash et al., 2001; Häkkinen, 2004; McFadzean, 2001a; 2001b).

The research in the literature in the substantive area of DCLAs is still relatively new, spanning only the last ten to fifteen years with the bulk having occurred in the last five to eight years. This chapter attempts to draw the research in the literature together for an overview of the common aspects deemed important in the execution of DCLAs as reported on by the researchers in their own scenarios, at the same time identifying areas not covered in the literature. This follows the synthesised coherence pattern described by Locke and Golden-Biddle (1997) where research items are cited and connections drawn to suggest the existence of underdeveloped research areas.

In this chapter, the importance attached to DCLAs worldwide and in different disciplines is illustrated (see section 3.2). Next, the more than sixty research items on DCLAs that were investigated for this thesis are categorised according to their research aim and focus (see section 3.3). To understand the collaboration problems facing DCLAs, the aspects affecting co-located collaborative
assignments are briefly discussed in section 3.4. This is followed by a discussion in section 3.5 of the common components present in all DCLAs, namely, the aim, environment, task, students, communication, teaming, facilitation, assessment and participation.

3.2 Widespread DCLA research

In the last fifteen years DCLAs have been introduced into course modules worldwide for several different reasons:


- Learning about the challenges and opportunities of asynchronous collaboration and working with people from other countries and backgrounds, for example Jarvenpaa and Leidner (1999) – masters in business courses, all continents and many countries; Vogel et al. (2000) – accountancy and business engineering courses, Hong Kong; Sarker and Sahay (2002; 2004) – information systems and informatics, Norway and USA; Massey, Montoya-Weiss and Hung (2003) – MBA, Japan and USA; Daniels et al. (1998) – software engineering course, Sweden; Akar et al.

• Allowing online students to learn course content collaboratively, for example, McFadzean (2001a; 2001b) – computer mediated teaching course, UK; Andrews and Schwarz (2002) – business communication and e-commerce courses, Australia; Allan and Lawless (2003) – MBA, Open University, UK, with students in 30 countries; Sudweeks (2003) – organisational informatics course, Australia; Buelens et al. (2005) – media studies course, Belgium.

• Spreading knowledge across disciplines and borders, for example, Sorensen and Takle (1999) – distributed computer supported collaborative learning, Denmark and USA; Hermann, Rummel and Spada (2001) – medical and psychology courses, Germany.


• Cultural information exchange, for example Gatlin-Watts, Carson, Horton, Maxwell and Maltby (2007) – six different business courses in seven different countries, including Europe, USA, Mexico and Canada.

• Researching aspects of virtual teaming with voluntary students, for example Burke (2001) – accounting exercise; Cogburn et al. (2002), Cogburn (2003) – various disciplines, USA and SA.

• Collaborating with industry experts, for example, Sullivan et al. (2004) – engineering economy course, USA.
• Training facilitators in DCLAs for online courses, for example, Taylor (2005) – online Web development and JavaScript course.

Although each DCLA is different with different outcomes, their execution is characterised by a set of common components. Each DCLA has a specific aim such as course content and/or life and virtual teaming skills learning. To accomplish the aim students have to complete a task collaboratively in teams that may be fully or partially distributed; Internet communication tools are used to communicate; and one or more lecturers facilitate the DCLA and do the assessment. The execution of DCLAs is influenced by the environment the students operate in, such as the availability of communication tools and the other responsibilities the students might have. Students have to participate in order to acquire the skills and knowledge themselves and they are dependent on the participation of the other team members and the lecturers/facilitators.

3.3 Research aim of DCLAs in the literature

More than sixty research items on DCLAs written worldwide in the past fifteen years were investigated for this thesis. These items include journal research articles, masters and doctoral theses, and books. The items were collected from online research databases, the Internet, the library, inter-library loan and personal contacts. The research aims of the items vary and are summarised in the following table.

<table>
<thead>
<tr>
<th>References</th>
<th>Focus</th>
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<tbody>
<tr>
<td>Alexander (2002)</td>
<td>Attempted to identify the success factors. Her aim was content learning, but the project was abandoned after a year as participation was low and the learning did not show any correlation with participation.</td>
</tr>
<tr>
<td>Birch and McDonald (2007)</td>
<td>Investigated aspects of distance education students' likes/dislikes in DCLA using a lecturer-determined survey. Some of the questions were related to participation.</td>
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### Holistic approach – focused on a combination of factors

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<th>References</th>
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<tr>
<td>Edwards and Sridhar (2005)</td>
<td>Canadian and Indian students had to complete a software development task after which they completed a Likert scale based questionnaire with preset questions.</td>
</tr>
<tr>
<td>Egea and Gregor (2002)</td>
<td>Investigated factors that also affect industry virtual teams.</td>
</tr>
<tr>
<td>Knoll and Jarvenpaa (1995)</td>
<td>Used student communication scripts and surveys to investigate learning to work in global teams, electronic socialisation skills and global communication skills.</td>
</tr>
<tr>
<td>Marcellino (2007)</td>
<td>Investigated the metaphors education students used to describe their virtual team experiences.</td>
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<tr>
<td>Munkvold and Line (2002)</td>
<td>Reported on their own experiences as lecturers and facilitators in two DCLA cycles.</td>
</tr>
<tr>
<td>Qureshi et al. (2004)</td>
<td>Investigated the key factors influencing the success of DCLAs by following a Straussian GT approach.</td>
</tr>
<tr>
<td>Vogel et al. (2001)</td>
<td></td>
</tr>
<tr>
<td>Scott et al. (1997)</td>
<td>Although the authors concentrated on whether virtual teams with students from different countries can produce similar results to face-to-face teams, students were surveyed for their opinion of success and suggestions on what to modify.</td>
</tr>
<tr>
<td>Taylor (2005)</td>
<td>Relates the experiences of several different DCLAs executed by different lecturers and briefly discusses some aspects that influenced them.</td>
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### Focused research – focused predominantly on one factor

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<th>References</th>
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<tbody>
<tr>
<td>McFadzean and McKenzie (2001)</td>
<td>Lecturer facilitation</td>
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<td>Burke (2001)</td>
<td>Task</td>
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<td>References</td>
<td>Focus</td>
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<tr>
<td>Massey et al. (2003), Paulus (2005), Stacey (2005), Sudweeks (2003)</td>
<td>Communication process</td>
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<td>Beranek and Martz (2005)</td>
<td>Virtual team training</td>
</tr>
<tr>
<td>Jarvenpaa and Leidner (1999), Tovey Southard and Bates (2005)</td>
<td>Trust and swift trust</td>
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<tr>
<td>Jensen and Heilesen (2004), Sarker and Sahay (2002; 2004)</td>
<td>Role of time, place/space and identity</td>
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<td>Prins, Sluijsmans, Kirschner and Strijbos (2005)</td>
<td>Peer assessment</td>
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<td>Allan and Lawless (2003)</td>
<td>Stress</td>
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<td>Baheti et al. (2002)</td>
<td>Programming in pairs</td>
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<td>Hoag and Baldwin (2000)</td>
<td>Student attitude, personality and skills.</td>
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<td>Joiner, Scanlon, O’Shea and Smith (2001)</td>
<td>Problem solving</td>
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<tr>
<td>Nash et al. (2001)</td>
<td>Defining and evaluating CSCL projects</td>
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</table>
### Focused research – focused predominantly on one factor

<table>
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<th>References</th>
<th>Focus</th>
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<tr>
<td>Ocker (2005)</td>
<td>Creativity</td>
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<tr>
<td>Pauleen and Yoong (2004)</td>
<td>Online meetings</td>
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Data collection in the different literature research items varied from observation (limited in a virtual environment); analysing communication scripts (readily available if students were required to use specific communication/collaboration technologies, but voluminous when more than a few teams were participating, lacking any face-to-face, phone and private email trails, and with the concern that lecturer access might affect the way students communicate); surveys (specific issues could be addressed, but with the disadvantage that the students were led by lecturer/researcher-defined questions with little possibility of adding other issues that affected them); and student reflections (open-ended, but more difficult to analyse than, for example, surveys). The surveys that were conducted and were used to generate the research results had limitations in that they were not necessarily representative. The findings are based on the questionnaires that were returned. For example, in the research of Scott *et al.* (1997), the findings are based on 123 questionnaires from 213 students and Huang *et al.* (2005) only received a 29% response rate to questionnaires posted to past students who had graduated. The question can be asked whether there is a correlation between the non-return of the questionnaires and a negative DCLA experience which was not taken into account in the findings, therefore, possibly biasing the results.

### 3.4 Co-located collaborative learning

Collaborative learning is relevant for this thesis as DCLAs are based on collaborative learning, albeit with the added complexity of teaming over a distance.
3.4.1 Collaborative versus cooperative learning

Cooperation is seen as group learning in a structured environment with the lecturer in control. S/he provides the questions, learning material, requirements for the deliverables, structure of group report-back and follow-up work. The assignments can be split into subtasks at an early stage and assigned to different students. Each student completes his/her subtasks individually and cooperates to combine the tasks into a final product (Paulus, 2005). Collaborative learning, on the other hand, allows more freedom with the responsibility for controlling learning experiences being shifted from the lecturer to the students themselves. The lecturer stands back and takes the role of facilitator allowing the process to become very open ended. The tasks are not split, but the whole team works together to develop a shared understanding that surpasses what could be achieved individually.

DCLAs tend to have components of both cooperative and collaborative learning. The students usually split the assignment early on to reduce the need for communication (Paulus, 2005; Olson-Buchanan et al., 2007), but the lecturer also has to relinquish control and move to a facilitator role as a result of lack of access to all the students and the ability of students to work anywhere anytime. All the DCLAs will be referred to as collaborative in this thesis in line with the convention adopted by some researchers to ignore the distinction and use the terms interchangeably (De Villiers, 1995; Panitz, 1997; Barkley, Cross & Major, 2005; Stacey, 2005).

3.4.2 Five essential elements

Johnson, Johnson and Smith (1998) define five essential elements of collaborative learning in a frequently cited article. They are the following:

- **Positive interdependence:** For an individual to succeed the group has to succeed; this is required to motivate the students to help each other.
• *Face-to-face promotive interaction*: The students are required to help, support and encourage each other while working in close proximity to each other.

• *Individual and group accountability*: Students are assessed individually and as a group. It is, therefore, in each student’s interest to ensure that the other group members also learn.

• *Development of teamwork skills*: Students have to learn a combination of academic and teaming skills.

• *Group processing*: Students must also learn to evaluate their group’s productivity, which actions were conducive or detrimental to achieving the group’s goals, and what can be continued with and what needs to change.

The five essential elements are also relevant to DCLAs, except that face-to-face promotive interaction is replaced by distance promotive interaction.

### 3.4.3 Benefits of collaborative learning

Well-applied collaborative learning has academic and social skills benefits (Panitz & Panitz, 1998; Panitz, 1999a; Panitz, 1999b; Barkley *et al.*, 2005; Stacey, 2005):

*Academic benefits*: Because students take responsibility for their own learning and building of skills, they learn to focus on learning rather than performance.

*Social skills benefits*: Students learn social skills, especially skills related to working in a group. Students also build relationships with fellow students and learn how to manage conflict.

### 3.4.4 Costs

Although the advantages of collaborative learning are well-documented, research reports in terms of failure, student criticism and dissatisfaction, and the impact on
the lecturers are less common. Several student and lecturer concerns have been identified by Kruck and Reif (2001) and Barkley et al. (2005).

**Student concerns:** not all teams work well together; some students do not get along resulting in high levels of frustration; not all students are committed to the assignment or their groups and free-riding and more dominant members are common and affect team spirit; students operate under varying work ethic codes; different members work at different speeds resulting in some students being advantaged and others disadvantaged in groups; time is wasted on discussions that go off the topic; time and effort are required to organise groups, plan action and reach consensus especially if the group contains individual thinkers; “group think” occurs where members tend to go along with the majority instead of challenging ideas; students have concerns about how to motivate team members; leadership is a contentious issue as in some groups no student wants to take the leadership role and in others more than one student fights for it; grades are largely out of the individual student’s control and in the hands of the other members of the group causing higher achievers to fear that they will not get their high marks which impacts on their motivation, bursaries, prizes and future job opportunities; students have to take responsibility themselves for determining what is right and wrong and what is important.

**Lecturer concerns:** the lecturer needs to invest extra time and effort; the lack of predictability results in uncomfortable and insecure feelings as the lecturer loses his/her authoritative edge when students turn to peers and other sources for information; lecturers are concerned about how to motivate students; and grading individual contributions is difficult and impacts on group and individual accountability.

The disadvantages of collaborative learning in co-located teams are magnified in a virtual environment with its loss of observability and diminished lecturer control.
3.4.5 Operational

Several operational recommendations need to be considered for collaborative learning to be successful (Kruck & Reif, 2001; Barkley et al., 2005).

Training and orientation: Students need to receive training and be orientated before the assignment starts. From being predominantly listeners, observers and note takers, students have to become active problem solvers, contributors and discussants. Competition from peers is replaced by collaboration, and independent learning changes to interdependent learning. Without proper orientation students have to identify and cope with these changes on a trial-and-error basis, increasing the cost in terms of time, effort and frustration.

Membership management: Groups have to be formed and membership managed. Students need time to get to know their team members and it is important that teaming policies and procedures are laid down in advance. Groups can vary in the length of time they stay together and the complexity of the tasks they have to perform. Team sizes vary depending on the task, but the group should be small enough to allow all members to participate and large enough to allow for sufficient diversity and enough resources to complete the task – five has been found to be optimal in general (Barkley et al., 2005). Group membership can be random, student selected or teacher determined and can be heterogeneous or homogeneous.

Task: The task must be appropriate for collaboration and must comply with the learning aim. It should have structure to enable students to take over control, be relevant and not feel like “busy work”, and all the students in the groups must be challenged – strong, middle and struggling (Schniedewind & Davidson, 2000). Further, it should match students’ abilities and skills, promote interdependence, ensure group and individual accountability, and be planned for each phase, from group forming to assessment. Ideally, the task should take into account the different cognitive levels of knowledge according to Bloom’s taxonomy:
comprehension, application, analysis, synthesis and evaluation, as appropriate for the level of study (Alexander, 2002).

**Team facilitation:** In the beginning the lecturer needs to explain the task and objectives and train and orientate the students. After the introduction the lecturer hands over control to the students and stands back to become a facilitator. Ideally, observation is unobtrusive and interaction supportive and not directive. It is the lecturer’s responsibility to ensure that the learning goals are achieved and problems are identified and solved when they become severe or start to interfere with a group’s ability to complete the task successfully. On completion the lecturer helps the students to reflect. By closing the assignment effectively, any negative feelings can be turned around and students motivated for future projects.

**Assessment:** Assessment to ensure individual accountability and positive group interdependence is difficult in a collaborative environment. Ideally, a group grade and an individual grade should be given to ensure that the grades reflect personal learning. If not, students may become demotivated and develop negative feelings towards collaborative learning. In extreme cases, it could result in lawsuits. Defining and clarifying assessment criteria and standards at the beginning of the assignment can make it more consistent and fair. If students know what is expected of them, they will be able to assess their own and their peers’ work and give each other constructive feedback. Important questions to be answered in the assessment process are what to evaluate, how (formative or summative), and by whom (lecturers, self-evaluation by students, and/or peer evaluation by students).

In DCLAs the training and orientation, membership management, selection of appropriate tasks, team facilitation and assessment are considerably more complicated owing to the lack of knowledge and unfamiliarity of distance team members, the lack of observations and minimal lecturer control over the execution of assignments.
3.5 Distributed collaborative learning

In this section the common components present in all DCLAs, namely, the aim, environment, task, students, communication, teaming, facilitation, assessment, and participation are discussed in more detail. Research items are cited, connections drawn, and the existence of underdeveloped research areas identified.

Researching DCLA has its limitations. The literature lacks in research that covers aspects of DCLAs in general as only four of the more than 60 research items that were investigated for this thesis, report findings that are not based on only one scenario (Bailey and Luetkehans, 1998; Nash et al., 2001; Håkkinen, 2004; McFadzean, 2001a; 2001b). Two of the studies researched aspects of DCLAs with half the groups acting as control groups (Beranek & Martz, 2005; Massey et al., 2003). These studies raise ethical questions in an educational setting. In the case of Massey et al. (2003), the DCLA contributed 10 to 15% to the course grade and the teams that had high lecturer involvement outperformed those that did not. How fair this was towards the participating students is questionable. Ethical issues make experimental research with control groups like this difficult to execute. This might explain the tendency to study specific DCLAs in situ as was more the tendency in the literature, but has a limitation in terms of access to different research settings.

The aim of this section is to contribute to the existing body of knowledge in the area of DCLAs by drawing connections between factors that affect individual DCLAs as reported in the literature, in the process identifying underdeveloped research areas according to the synthesised coherence pattern described by Locke and Golden-Biddle (1997).
3.5.1 Aim

DCLAs have additional benefits to co-located collaborative learning assignments (see section 3.4.3), for example, convenience of working anywhere anytime; level playing fields for all students full-time, part-time, on another campus or in another country (valuable for distance learning students); meeting students from other places; a different approach to the assignment from different places; the value of feedback from unknown peers; learning virtual team skills, possibilities and limitations; experiencing technology; and developing online communication skills (Scott et al., 1997; Vogel et al., 2000; McFadzean, 2001b; Zhao & Akahori, 2001; Egea & Gregor, 2002; Munkvold & Line, 2002; Sudweeks, 2003; Sullivan et al., 2004; Whatley et al., 2006; Birch & McDonald, 2007; Olson-Buchanan et al., 2007). In multi-country teams, students especially enjoyed being part of an international team, working with people of a different culture, communicating with people across the world, and learning about other cultures and their ideas (Knoll & Jarvenpaa, 1995; Vogel et al., 2000; Akar et al., 2004; Edwards & Sridhar, 2005; Whatley et al., 2006).

A dilemma in DCLAs employed for learning skills such as virtual teaming, online communication and collaborating with different cultures is that the task the students have to perform is generally not tied to the aim, but merely a vehicle for achieving the aim. Unfortunately, the deliverables of the task are what is usually assessed, as these are readily available for assessment, not the acquisition of skills which is difficult to assess at a distance. This creates disparity between the aim and the marks awarded. As Edwards and Sridhar's research (2005) showed, the quality of the deliverable showed no correlation with the effectiveness of the learning. This aspect was not discussed in the literature.

3.5.2 Environment

The level of virtuality of the DCLAs in the literature ranges from students being in the same class and able to meet face to face (Glückler & Schrott, 2007), to
national or global teams where subgroups are co-located (Gatlin-Watts et al., 2007), to online courses where the all the students are distributed (Liu et al., 2008).

The population size can be small and the teams relatively homogeneous, such as De Hart’s (2005) class of 10 students forming one team, to large multinational teams with 700 students from seven different countries forming numerous teams (Gatlin-Watts et al., 2007). This affects the familiarity among lecturer and student and student and student and affects the facilitation that can take place. When DCLAs span more than one site the yearly variation in population size on the different sites can affect the team sizes as all the teams need to have distributed members. Student numbers are not within the lecturers’ control and when the numbers are not balanced students on the campuses with the lower numbers find themselves at a disadvantage (Hoag & Baldwin, 2000; Munkvold & Line, 2002). No focused research on the impact of population size and homogeneity on DCLAs was executed in the literature.

Environmental factors such as external commitments affect the time students can spend on a DCLA. Except for referring to part-time students who had other work responsibilities that affected their participation (Qureshi et al., 2004), none of the authors mentioned any other external influences such as other course demands, tests or external commitments.

3.5.3 Task

Jacques et al. (2007) caution against the practice of virtualising existing individual or co-located assignments. To enforce teamwork and collaboration, tasks have to be complex enough to require teamwork, but not too complex to discourage students from participating (De Hart, 2005). This is a difficult balance, and is merely mentioned, not researched, in the literature. Suitable task types vary in their complexity, uncertainty, ambiguity and amount of collaboration required (Vogel et al., 2001; Qureshi et al., 2004). They are also dependent on other
aspects of DCLAs, such as the course, the maturity of the students, the purpose of the DCLA, level of virtuality, team size, weight of the marks for the student’s total course mark, and the time period available.

Tasks have to be clear, well structured and easy to follow with clear instructional goals and measurable performance outcomes provided at the beginning of the assignment. Uncertainty increases the need for communication which is the nemesis of DCLAs. Certain things cannot be cleared up quickly in a distributed environment thus wasting time and causing stress (Scott et al., 1997; Bailey & Luetkehans, 1998; Vogel et al., 2000; McFadzean, 2001a; 2001b; Egea & Gregor, 2002; Allan & Lawless, 2003; Häkkinen, 2004, Jacques et al., 2007). On the other hand, tasks should not be over-structured thus removing the need for collaboration. Again a delicate balance is needed which was not researched.

Tasks can be cooperative or collaborative in nature. Cooperative tasks are preferred as students can split the tasks into subtasks that can be completed individually and then combined into a final product. It reduces the need for collaboration, however. Where tasks were truly collaborative students still tried to split them, albeit often in an unproductive way where subteams had to wait for other subteams to complete sections (Sarker & Sahay, 2002; Paulus, 2005). Balancing cooperative and collaborative components in a task is important and is affected by the other components in the DCLA such as the aim, students and environment. This poses another area open for research.

Task duration varies with the purpose of and time available for the course module. If the time frame for an assignment is too long students tend to lose interest (De Hart, 2005). On the other hand, the time allowed cannot be short as communicating and teaming by means of technology requires substantial extra time (Knoll & Jarvenpaa, 1995; Scott et al., 1997; Cogburn, 2003; Akar et al., 2004; Jacques et al., 2007). The duration also has to correspond with the marks so as to compensate students fairly (Knoll & Jarvenpaa, 1995; Birch & McDonald,
Balancing duration against mark weighting is difficult, as giving an appropriate high weighting to compensate for the time requirements means that the students’ marks are influenced to a large extent by an assignment over which they have little control and this causes stress and unhappiness. Again, this was mentioned in the literature, but not researched.

### 3.5.4 Students

Senior students generally show more commitment and responsibility than younger students in the less controlled environment of DCLAs (McFadzean, 2001a; Taylor, 2005). This was noted by authors and was a general trend, but owing to limitations in research settings difficult to research.

To operate successfully in a virtual team members need *personality* traits such as discipline, assertiveness, responsibility, dependability, independence, self-sufficiency, a highly developed work ethic, and the ability to handle uncertainty and loss of control (Bailey & Luetkehans, 1998; Jarvenpaa & Leidner, 1999; Vogel *et al.*, 2000; Sarker & Sahay, 2002; Cogburn, 2003). Not all students have the personality to operate in virtual teams, but in DCLAs have no choice as they will forfeit the marks if they do not. The effect of forced participation on DCLAs was not covered by the research items investigated.

Students in the DCLAs in the literature showed a surprising sense of *loyalty* to the local class/campus. They participated because they did not want to let their team down as it would reflect badly on themselves and on their campus. This loyalty was surprising as it was expected that it would be easier for a student not to be committed when s/he is unknown (Allan & Lawless, 2003; Taylor, 2005). This is an unexpected finding that warrants more research.
3.5.5 Communication

Owing to the importance of communication in DCLAs, it was addressed by almost all the authors and focused on by several (see table in section 3.2). Communication covers two aspects, namely, the tools and the process.

**Tools**

Several researchers preferred technological tools that left a communication trail for lecturers to follow (Daniels et al., 1998; Jarvenpaa & Leidner, 1999; Lally, 2000; Last, Daniels, Almstrum, Erickson & Klein, 2000; Hermann et al., 2001; Joiner et al., 2001; Vogel et al., 2001; Andrews & Schwarz, 2002; Daradoumis & Marques, 2002; Sarker & Sahay, 2002; Cogburn, 2003; Qureshi et al., 2004; Okada, 2005; Ocker, 2005; Paulus, 2005; Glückler & Schrott, 2007; Olson-Buchanan et al., 2007; Liu et al., 2008). This allowed lecturers to monitor group processes and to identify individual contributions for assessment. Having a trail also allowed students who had not participated for a while to catch up easily. In addition, the trail was used as data for the research. Not all students felt comfortable with lecturers monitoring the trails, however. Student opinions in Sudweeks’s (2003) research showed that approximately half of the students were not comfortable with lecturers accessing discussions and Olson-Buchanan et al. (2007) found that it interfered with the teams’ decision-making processes. Lecturers also found processing all the communication scripts very time consuming (e.g. 200 postings per team for 50 teams [Olson-Buchanan et al., 2007]), and messages had to be assessed not only in terms of quantity but also quality (Knoll & Jarvenpaa, 1995).

Email was the most commonly used communication tool and has advantages in that practically all students have access to it and are familiar with the technological side of using it. The main drawback with email in DCLAs is that there is no guarantee that they are sent, delivered, or read. A student can claim that an email was sent when it wasn’t (“cheque in the post”-phenomenon). On the other hand, the email could have been sent, but not have been delivered although participants
generally expect them to be. Neither the sender nor the receiver may be aware of the non-delivery, resulting in stress and possible friction and loss in trust. A further drawback is the time delay between sending an email and receiving a response, making it difficult to follow threads (Knoll & Jarvenpaa, 1995; Bailey & Luetkehans, 1998; Daniels et al., 1998; Last et al., 2000; McFadzean & McKenzie, 2001; Allan & Lawless, 2003; Birch & McDonald, 2007). If the lecturer is copied in on the emails it can generate a high volume of items which, without the luxury of threads, are difficult and time-consuming for the lecturer to analyse (Cogburn, 2003), for example 16 students generated 2 745 emails over five weeks (Glücker & Schrott, 2007).

In addition to email, numerous other tools were used in the DCLAs, for example video- and audio-conferencing, forums, chat programs, bulletin boards, schedule managers, web pages, shared workspaces, document repositories and report writing systems. The advantage of these tools is that students learn additional skills. On the other hand, several disadvantages exist, namely, the tools cost money; are not readily available on all sites; lack of technical support at remote sites; students need to be trained in their technical and effective use; and if the tool is synchronous, it is difficult to organise meetings as students have different timetables at the different sites and their own private schedules (Scott et al., 1997; Vogel et al., 2000; Edwards & Clear, 2001; Andrews & Schwarz, 2002; Munkvold & Line, 2002; Allan & Lawless, 2003; Taylor, 2005; Gatlin-Watts et al., 2007).

**Communication process**

The role of communication in collaboration and the students' need for training in online communication and collaboration skills are popular topics discussed by several authors (Bailey & Luetkehans, 1998; Daniels et al. 1998; Sorensen & Takle, 1999; Last et al., 2000; Vician & Brown, 2000; Vogel et al., 2000; McFadzean & McKenzie, 2001; Pencek & Bialaszewski, 2001; Zhao & Akahori, 2001; Andrews & Schwarz, 2002; Munkvold & Line, 2002; Daradoumis & Marques,
Having to rely on predominantly written communication affects communication patterns in several ways: it is more time-consuming to type communication; there is no observable body language; students fear looking stupid with communication that is stored for everyone to return to and view at any time; some students have inhibitions in expressing themselves in writing; and there is often a delay between sending a message and receiving a response making it difficult to follow threads. On the positive side, students have more opportunity to reflect and interact; more novel ideas are expressed; less time is wasted by not drifting from the topic; and several students feel more comfortable with online than face-to-face communication and are more likely to share opinions (Sorensen and Takle, 1999; McFadzean, 2001a; Sudweeks, 2003; Akar et al., 2004; Taylor, 2005).

A substantial amount of information is transmitted during a DCLA. This can result in an information overload causing stress. The application of filters does not solve the problem as discarded communication creates its own type of stress in both the sender and the intended receiver (Scott et al., 1997; Bailey & Luetkehans, 1998; Allan & Lawless, 2003).

### 3.5.6 Teaming

Vogel et al. (2000) maintain that the focus should be less on technology and more on human aspects, as teams experienced more social than technical failures. In common with communication, DCLA teaming was a popular topic in the research literature often forming the focus of the research, albeit limited to single scenarios. In addition, a substantial body of knowledge exists in the substantive areas of industry virtual teams and co-located teaming. These areas lack the educational component, but give valuable additional insights in the teaming aspects of DCLAs.

Stacey (2005) contends that the ideal group size for decision making is five, although there seems to be some consensus that, contrary to the optimal size of
five in co-located collaborative learning (see section 3.4.5), three to four is ideal for DCLAs (Bailey & Luetkehans, 1998; Joiner et al., 2001; Zhao & Akahori, 2001). This is, however, dependent on the other aspects of DCLA such as the aim and the task. In larger groups, individual members tend to be less productive and have more opportunity for hiding and free-riding, especially in DCLAs with their lack in observability. The effect of team size on DCLA was not covered in the literature items.

In virtual teams, the students on the other campuses are unknown, making team member selection by lecturers or students according to member characteristics impossible unless additional processes are employed to determine them (McFadzean, 2001a; Taylor, 2005; Marcellino, 2007). The authors that grouped students according to characteristics did not explain how they managed to set up all the teams to contain the necessary strengths and weaknesses without encountering the problem of leftover students who did not fit into any of the teams and teams not having members covering all the skills needed. The alternative is to assign students randomly or according to an alphabetical list, however, the drawback of this is that some teams may consist of only academically stronger and other teams of only weaker students. Both options pose ethical problems, especially if the weighting of the DCLA is high in the course module. Although mentioned, team member selection in DCLAs was not focused on in the literature.

Both Ocker (2005) and Stacey (2005) maintain that learning teams should not be homogeneous. Homogeneity can cover many different aspects within smaller or larger brackets on a homogeneity scale. For example, in a single course module students are generally relatively homogeneous in aspects related to that course module’s content and skills. On the other hand, they are not homogeneous in knowledge, commitment, personality traits and skills when compared to each other in class. Teams spanning discipline and/or national boundaries were more profoundly heterogeneous and students generally enjoyed communicating with people from other cultures (Vogel et al., 2000; Sarker & Sahay, 2002; Cogburn,
The role homogeneity and cultural differences play in DCLAs is related to the task, students, communication tools, communication skills, facilitation and assessment, but their impact on DCLA still needs focused research.

For team building it is advised that students should initially meet each other face to face or, if this is not possible, be given a synchronous teambuilding exercise to get to know each other. Ideally, this is followed up frequently with synchronous activities (Bailey & Luetkehans, 1998; Daniels et al., 1998; Last et al., 2000; Vogel et al., 2000; McFadzean, 2001b; McFadzean & McKenzie, 2001; Andrews & Schwarz, 2002; Jensen & Heilesen, 2004; Taylor, 2005; Olson-Buchanan et al., 2007). The establishment of strong social relationships are advantageous in that they reduce the need to communicate and explicitly formulate norms. For example, members accept that conduct such as silence has an acceptable reason and is not a cause for concern. In DCLAs the time span is often too short to build strong relationships and, therefore, more rules and regulations are needed (Jarvenpaa & Leidner, 1999; McFadzean & McKenzie, 2001; Andrews & Schwarz, 2002; Sarker & Sahay, 2002; Olson-Buchanan et al., 2007).

Typical positive social interactions included compliments, humour, personal information, honesty about technical abilities, communication of feelings, the adding of emoticons, and showing an interest in fellow members. High performers exchanged many social messages compared to low performers who did not try to get to know each other socially but focused on the task (Knoll & Jarvenpaa, 1995; Daniels et al., 1998; Jarvenpaa & Leidner, 1999; Last et al., 2000; McFadzean, 2001b; Andrews & Schwarz, 2002; Egea & Gregor, 2002; Häkkinen, 2004).

Students were reluctant to report teaming problems as they were concerned that they would lose marks. With less lecturer control and lack of observability, these problems often only surfaced closer to the hand-in dates when students felt the
deliverables were adversely affected (Buelens et al., 2005; Marcellino, 2007). This aspect is important and needs more research.

The setting and communicating of clear, specific and measurable goals right from the start is crucial in virtual teams with their lack of observability. The goals should not just cover learning or to derive at a deliverable, but also each stakeholders’ own goals. Personal goal disparity is prevalent in student teams in that the mark needed to pass does not correspond to the mark the more diligent students aim for. Unless communicated, the students do not know in a distributed environment what the goals of the distance members are. The effect of disparate student goals on DCLAs was not referred to in the literature.

Although rules, roles and responsibilities were not always applied in DCLAs, they were seen as important. Clearing up uncertainties and discovering misunderstandings over a distance is difficult and often only happens after duplication of efforts and/or substantial wasting of time and effort (Bailey & Luetkehans, 1998; Jarvenpaa & Leidner, 1999; McFadzean, 2001a; 2001b; McFadzean & McKenzie, 2001; Nash et al., 2001; Andrews & Schwarz, 2002; Egea & Gregor, 2002; Allan & Lawless, 2003; Sudweeks, 2003; Häkkinen, 2004; Jensen & Heilesen, 2004; Ocker, 2005; Okada, 2005; Birch & McDonald, 2007; Jacques et al., 2007; Olson-Buchanan et al., 2007).

A good team leader who manages the teaming and task execution processes minimises confusion and frustration. This is even more important in a virtual environment with its lack of observability and reduced control than in co-located teams. Choosing the right leader is difficult in co-located collaborative learning (see section 3.4.4), but even more difficult in DCLAs. With a lack of information on team members, leadership is typically assigned to the person volunteering or initiating communication, or the one who sends the most communication in the beginning. This does not necessarily result in the best person being chosen. (Daniels et al., 1998; Jarvenpaa & Leidner, 1999; Last et al., 2000; Munkvold &
The research articles do not cover rules and guidelines for choosing the best leader in a DCLA.

Effective project management is crucial in a virtual environment where problems are not easily picked up due to the lack of observability and the strain on communication (Knoll & Jarvenpaa, 1995; Edwards & Clear, 2001; McFadzean & McKenzie, 2001; McFadzean, 2001b; Pencek & Bialaszewski, 2001; Vogel et al., 2001; Andrews & Schwarz, 2002; Allan & Lawless, 2003; Qureshi et al., 2004; Jensen & Hielesen, 2004; Taylor, 2005).

One of the advantages of co-located collaborative learning is the opportunity for students to work together to develop a shared understanding that surpasses what can be achieved individually (see section 3.4.1). This could not be transferred to DCLAs. Student communication content in the DCLAs researched was generally of a superficial nature and lacked in inquiry questions that would elicit elaborate explanations, challenge and explain cycles, and the creation of in-depth thought and new knowledge construction. Students tended to exchange existing information, ask fact-seeking questions, focus on housekeeping tasks, and concentrate on how to make collaboration work (Knoll & Jarvenpaa, 1995; Jarvenpaa & Leidner, 1999; Vician & Brown, 2000; Häkkinen, 2004; Paulus, 2005). Okada (2005) stresses the importance of training to teach students methods for building knowledge collectively and articulating what is meaningful.

In successful groups members checked each other’s work (Edwards & Clear, 2001) and teams that had received more initial guidance spent more time on critically examining and discussing each other’s contributions (Massey et al., 2003). In general, however, critical feedback was minimal (Ocker, 2005). Students tended to ignore the information sent by others and were tardy about sharing their own information (Pencek & Bialaszewski, 2001). More research is needed on how to promote critical feedback in DCLAs.
Students do not share the same work ethics. An aspect that frustrated the more diligent students was the tendency of some team members to slack during the assignment and work hard towards the due dates. In a distance environment students and lecturers have little control over the work habits of students on other sites (Pencek & Bialaszewski, 2001; Massey et al., 2003; De Hart, 2005; Ocker, 2005; Taylor, 2005).

Jarvenpaa and Leidner (1999) introduced the concept of swift trust. With the short duration of most DCLAs, there is no time to develop full trust and students have to rely on depersonalised, action-based, assumed “swift trust” that develops from members’ initial interactions (Jarvenpaa & Leidner, 1999; Hoag & Baldwin, 2000; Edwards & Clear, 2001; Allan & Lawless, 2003; Tovey et al., 2005).

Overt conflict was surprisingly low in the DCLAs. When conflict did exist it tended to be latent and covert. The limitation to only written communication makes it very time-consuming to resolve conflict and awkward without observing body language. The cost of conflict was often higher than the cost of not having the conflict (Knoll & Jarvenpaa, 1995; Daniels et al., 1998; Last et al., 2000; Vician & Brown, 2000; Vogel et al., 2001; Egea & Gregor, 2002; Munkvold & Line, 2002; Cogburn, 2003; Sudweeks, 2003; Akar et al., 2004; Qureshi et al., 2004).

When there are subgroups of students on different campuses there is the danger of an “us” versus “them” attitude. In some DCLAs, members complained that the local group worked harder than the distant group (Daniels et al., 1998; Hoag & Baldwin, 2000; Last et al., 2000; Cogburn, 2003), although this accusation was not shared by Akar et al.’s (2004) students. The literature shows conflicting research findings.

Negative prior experiences in co-located and/or distributed teams influence students’ attitudes towards the DCLAs (Olson-Buchanan et al., 2007). On the other hand, high performers in the DCLAs researched had high levels of enthusiasm and gave encouragement to their fellow team members (Knoll &
Jarvenpaa, 1995; Daniels et al., 1998; Jarvenpaa & Leidner, 1999; Last et al., 2000; Cogburn, 2003; Häkkinen, 2004).

Several authors commented positively on the quality of the deliverables: students satisfied with quality (Hoag & Baldwin, 2000); good/high quality (Pencek & Bialaszewski, 2001; Sudweeks, 2003; Akar et al., 2004); students proud of the work (Scott et al., 1997; Taylor, 2005); and extremely high quality in a masters level course (Vogel et al., 2000). This feeling was not universal with half of the teams of Munkvold and Line (2002) feeling they could have done better co-located and only one in four of the teams of Birch and McDonald (2007) feeling that they had received a better grade than doing it on their own. The reasons for the disparate views justify more research.

3.5.7 Facilitation

The facilitators in the literature were usually the lecturers of the courses modules who were also often the authors of the research articles. Facilitation was discussed in a number of the research items, but was mostly limited to the experiences of each researcher in his/her own unique scenario.

The level of facilitation varied from minimal involvement to extensive support (Vician & Brown, 2000; McFadzean, 2001a; 2001b; Akar et al., 2004; De Hart, 2005). Students, however, preferred a high level of access to the facilitator. Birch and McDonald (2007) found that when the facilitator adopted a proactive role in terms of facilitating the functioning of the virtual student teams, student activity increased. The danger exists, however, that the facilitators dominate discussions, act in an authoritarian manner, are not objective at all times, and are overly prescriptive. Over-facilitation can lead to a reduced virtual teaming experience (Bailey & Luetkehans, 1998; McFadzean, 2001a; Häkkinen, 2004). The level of facilitation is a delicate balancing act and needs to be taken into account in task selection and assessment. This was not focused on in the literature.
Several DCLAs were terminated owing to the high demands on lecturer time even with a small number of teams (Alexander, 2002; Taylor, 2005 [several cases]). Olson-Buchanan et al. (2007) report on the added lecturer workload, contending that institutions and faculties greatly underestimate the time and resources required. This was also experienced by other researchers such as Hoag and Baldwin (2000) and Sullivan et al. (2004). It raises the question as to whether the learning that takes place in the DCLAs justifies the additional time the lecturers need to invest. This feeling is not shared by all the authors who address facilitation. Some contend that the results are worth the effort and that their DCLA assignments would continue (Daniels et al., 1998; Hoag & Baldwin, 2000; Last et al., 2000). No record exists whether they actually continued, or were stopped when the attached research projects terminated. Most authors did not address this issue at all, however.

Student virtual team training varied between no training to detailed training before and during the assignments. The importance of giving students technology and team process training is emphasised by Hoag and Baldwin (2000), Vogel et al. (2000), Buelens et al. (2005), De Hart (2005), Birch and McDonald (2007), and Jacques et al. (2007).

In co-located collaborative learning assignments and DCLAs in online training courses, there is usually only one lecturer involved. On the other hand, in multi-campus DCLAs each site has its own co-located lecturer/facilitator resulting in a new set of complications. Firstly, if each facilitator advises the students on his/her own campus, it can result in different members of the teams receiving conflicting advice from their on-site facilitator. The alternative is to assign teams to single facilitators, but this can result in the remote members of a team feeling that they are at a disadvantage as they are not able to develop the same rapport or trust relationship with the facilitator as the on-site students (Munkvold & Line, 2002). Secondly, not all lecturers facilitate in the same way and having inconsistency across schools was one of the aspects most disliked by students (Bailey &
Luetkehans, 1998; Olson-Buchanan et al., 2007). Thirdly, students have been found to be wary of two people influencing their grades. Hoag and Baldwin (2000) suggest that the local lecturer must grade all his/her own students, and the other lecturer should be limited to providing feedback. The problems with multiple lecturers were noted, but were not the focal point of the research in the literature.

3.5.8 Assessment

Assessment is dependent on the aim, task, environment, student maturity, communication, teaming and facilitation. The area of assessment in DCLAs is still underdeveloped and under-researched. None of the options that currently exist for assessment are satisfactory or fair towards the students. A substantial amount of research is needed to develop better options.

*Fair* assessment is important as it addresses marks, which are the tangible rewards students receive for their efforts in an assignment. Marks can be a determining factor in the pass or fail of a course module which can, in turn, have a substantial impact on a student’s future. An individual student, however, has little control over the deliverables in a DCLA and has to rely on the contributions of fellow members with whom s/he is unfamiliar and who may not have the same commitment, work ethics or concept of quality (Allan & Lawless, 2003).

One of the challenges in DCLAs is the *disparity* between what is assessed in terms of the task deliverables and the real learning aims (Birch & McDonald, 2007). For example, Hoag and Baldwin (2000) maintain that their assessment measures did not capture the complexity of the learning process; Edwards and Sridhar (2005) found that the quality of the deliverable did not correlate with the effectiveness of learning; and Ocker (2005) found, to his dismay, that the most creative report received the lowest grade. This is contrary to the requirement that the aim, task and assessment of an assignment should correspond.

Determining *individual* task contributions is difficult in a distributed environment with a lack of traditional face-to-face observation and reduced control. Without a
method for determining individual contributions, each team member has to be given the same team mark. This violates one of the five essential elements of collaborative learning (see section 3.4.2), namely, group and individual accountability and encourages free-riding and the “sucker effect” (De Hart, 2005). If individual sections are included in the task it can reduce the need for collaboration, which is contrary to the aim of DCLAs. This again requires a delicate balance.

Using student communication records for an individual mark has proven to be less than ideal. As seen in section 3.5.5, lecturers’ lurking on communication can affect communication patterns. Lian (2000) found that students did not want to participate in online discussion forums in spite of the fact that they were assessed on their participation and the quality of that participation, the argument being that discussions are there to foster learning, that is, to discover, explore, discuss, evaluate and exchange. When lecturers monitor them and use their communications for assessment on the basis of quality and quantity, it defeats the purpose of the online discussion forums. A further problem encountered is that communication quantity can be relatively easily determined if the students have to use a specific tool for all their communication (limiting the communication process); however, quantity is not a true reflection of contribution without also evaluating the quality of the communication (Knoll & Jarvenpaa, 1995). Quality assessment is a substantially bigger challenge, very time-consuming, and there is still no guarantee that it is a fair reflection of contributions made to the DCLA (Sorensen & Takle, 1999).

An alternative method for determining individual contributions is peer assessment. By allowing peers to assign marks to each other it is hoped that members will be more likely to contribute. This notion was refuted when only 20% of the students in Kruck and Reif’s (2001) co-located collaborative learning study admitted that peer assessment motivated them. Furthermore, only 36% felt peer assessment motivated their team members. Peer rating was also found to be inaccurate, not
objective and biased in DCLAs. Where, in general, student ratings are consistent and correspond well with course marks in co-located teams (Crowe & Pemberton, 2000), this is not the case in distributed teams. Students do not know each other, cannot observe each other except for participation in communication, do not have to “face” each other afterwards, and have a “them” and “us” attitude if the DCLA is across different campuses (Alexander, 2002; Akar et al., 2004; Taylor, 2005). Although students had difficulty rating each other, a surprising phenomenon occurred when students had to rate themselves in that they tended to under-score themselves (Hoag & Baldwin, 2000). This was only mentioned, but not researched in the literature items.

Where more than one facilitator is involved there may be a disparity between the different assessment standards. Hoag and Baldwin (2000) let each lecturer grade all the deliverables, but mention that this was not ideal and each lecturer should grade his/her own students. This was also not researched.

Lian (2000) contends that the teaching objectives are communicated, but the assessment criteria are often ambiguous to both students and lecturers in DCLAs. With several assessors involved in each DCLA, most unfamiliar to a specific student, it is important that clear assessment criteria should be given right from the start and that they should include contributions to the task, not just the deliverables.

3.5.9 Participation

Participation aspects were referred to in several of the research items, but none focused their research on gaining a better understanding of the factors affecting student and lecturer participation in DCLAs. In an action learning environment, the effectiveness of DCLA learning depends on lecturer and student participation and commitment, therefore the participation of all members is important (Knoll & Jarvenpaa, 1995; Sudweeks, 2003; Beranek & Martz, 2005). Without participation the student not only forfeits his/her own learning experience, but also affects the
learning experience of his/her team members (McFadzean & McKenzie, 2001). The teams lose the contributions of the non-participants, but it also adds an extra load though wasted time waiting for contributions that are not forthcoming and trying to locate and motivate the members (Vogel et al., 2001; Qureshi et al., 2004; Olson-Buchanan et al., 2007). Due to the importance of participation and the problems experienced with participation in the DCLAs reported on in the literature, it is surprising that this aspect has not received more attention in terms of focused research.

Past badly-executed co-located experiences by students caused them to have concerns about non- or low participation of team members in an environment without face-to-face control and pressure (Olson-Buchanan et al., 2007). This was a valid concern as the DCLAs were marred by low commitment and low participation and, without visual cues, the lecturers could not detect who was and who was not participating. The only option was often to give each team member the same mark, encouraging more non- or low participation. In some DCLAs students would collectively gang up on the task, and try to finish the assignment as quickly and impersonally as possible. They seemed to tolerate the assignment, rather than embrace it (Daniels et al., 1998; Jarvenpaa & Leidner, 1999; Last et al., 2000; Edwards & Clear, 2001; McFadzean & McKenzie, 2001; Vogel et al., 2001; Andrews & Schwarz, 2002; Sudweeks, 2003; Akar et al., 2004; Häkkinen, 2004; Pauleen & Yoong, 2004; Qureshi et al., 2004; Buelens et al., 2005; Ocker, 2005; Taylor, 2005; Birch & McDonald, 2007; Glückler & Schrott, 2007; Olson-Buchanan et al., 2007; Marcellino, 2007).

Lecturers employed different incentives to coerce students into participating. One of the more popular approaches was to attach a relatively high weighting in the class mark to the DCLA (e.g. Kruck & Reif, 2001; Pencek & Bialaszewski, 2001; Beranek & Martz, 2005; De Hart, 2005). This is based on the belief that students find DCLAs difficult, but will be motivated to participate if they see tangible benefits for themselves and the collaborating students (Whatley et al., 2006). This
approach did not have the desired effect, however. For example, Jarvenpaa and Leidner (1999) assigned 20% of the course weight to the DCLA, but most teams still had inactive members. De Hart’s (2005) 30% weight also did not have the desired effect as participation remained low. Hoag and Baldwin (2000) assigned a 50% course weight to the assignment, but concluded that satisfaction and learning outcomes may be more related to a student’s positive outlook than factors such as grade point average. Pencek and Bialaszewski (2001) maintain that lower than 20% is not enough incentive for students to put much effort into the assignment. Even with a 20% weight some students did not take the assignment seriously. If the weighting is high the students feel it is unfair owing to the fact that they do not have much control over the deliverables. If the weighting is low the students feel that they have to put in a lot of time and effort for little value and, therefore, do not participate (Birch & McDonald, 2007). A fine balancing act needs to be followed when weighting DCLAs. This aspect was not focused on in the research in the literature.

Other approaches for coercing students into participating included peer assessment and tracking students’ communication. Both methods proved ineffective (see section 3.5.5 & 3.5.8). In some DCLAs students voluntarily participated for the learning experience (Gatlin-Watts et al., 2007) and some participated again in the next cycle. In other DCLAs executed specifically for their research value students were paid to participate (Hermann et al., 2001).

McFadzean (2001a) stresses the role of the facilitator to ensure that the students gain an enjoyable, comfortable and valuable experience. Positive incentives include an interesting and relevant task; good planning, facilitation, and training; and a safe environment free from flaming and personal attacks (McFadzean, 2001a; 2001b; Andrews & Schwarz, 2002). Campuses without a lecturer present showed a marked lower participation rate than the campuses with a lecturer present (Pencek & Bialaszewski, 2001; Cogburn et al., 2002; Cogburn, 2003). One aspect of participation that is outside the control of the lecturer, however, is the
influence of external factors such as workload. None of these aspects were focused on in the literature.

Whatley et al., (2006) contend that the motivation to participate may be affected by the student’s perception of the benefits for themselves and the collaborating students. McFadzean and McKenzie (2001) identified self-interest, common values, mutual support, demanding tasks (cannot be done alone), feelings of accomplishment and structured socialisation (feel part of a successful community) as reasons for commitment. Activities where each student felt s/he could contribute and add value, such as brainstorming, showed the most consistent participation (Knoll & Jarvenpaa, 1995). This is supported by Bailey and Luetkehans (1998) who identify the major reason for disappearance being the feeling of not being connected. Insecurity caused by the reduction in control was also a major negative factor affecting students’ motivation to carry on participating and learning (Jarvenpaa & Leidner, 1999; Sorensen & Takle, 1999).

In industry, virtual team members are chosen on personal characteristics that are compatible with working in a virtual environment (Pauleen & Yoong, 2001). They are, typically, very senior staff members (can take responsibility); people right out of school (their expectations aren’t set); brilliant loners with a successful track record; or people with similar previous experience and a past history of achievement. Typical personality traits include: highly motivated; self-disciplined; committed and responsible; doers; and willing to get involved (Staples, Hulland & Higgins, 1998; Johnson et al., 2001; McInnes, 2001; Arnison & Miller, 2002; Chinowsky & Rojas, 2003; Murphy, 2004; Staples, Wong & Cameron, 2004; Turban, Leidner, McLean & Wetherbe, 2006). In student teams the luxury of selecting students with suitable characteristics does not exist, as all students have to participate. How to handle this limitation in DCLAs needs to be researched.

According to several authors the participants generally felt the DCLAs were a worthwhile experience, were interesting and stimulating, had educational value
(knowledge and skills learning), and/or were enjoyable, regardless of the additional
time invested and the frustrations and stress experienced (Knoll & Jarvenpaa,
1995; Daniels et al., 1998; Scott et al., 1997; Hoag & Baldwin, 2000; Pencek &
Bialaszewski, 2001; Vogel et al., 2000, 2001; Andrews & Schwarz, 2002; Egea &
Gregor, 2002; Munkvold & Line, 2002; Sudweeks, 2003; Akar et al., 2004; Qureshi
et al., 2004; De Hart, 2005; Paulus, 2005; Taylor, 2005; Birch & McDonald, 2007;
Gatlin-Watts et al., 2007; Marcellino, 2007; Olson-Buchanan et al., 2007). The
question here is whether these findings are based on information supplied by
students who were motivated to do the assignments and participated and,
therefore, expressed their opinion and returned questionnaires, or whether this
includes students who were negative towards the assignments and did not bother
to voice their opinions and/or return the questionnaires. For example, the findings
of Scott et al. (1997) were based on a return of only 123 out of a possible 213
questionnaires; Knoll and Jarvenpaa (1995) experienced participation problems;
Hoag and Baldwin (2000) admitted that satisfaction might be more related to a
student’s positive outlook than to other factors; and Birch and McDonald’s (2007)
students admitted to the value, but did not enjoy the assignment, and found it
frustrating and time-consuming. A student might feel that the assignment is
worthwhile, but still not participate for other reasons. This was not researched in
the literature.

Buelens et al. (2005) state that the learning achieved is dependent on the tasks,
the way the teams are organised, who participate and how the teams are held
accountable. This raises the question whether participation in the DCLAs can be
increased if a workable balance can be reached between the aim, environment,
task, students, communication, teaming, facilitation and assessment. In addition,
the question can be asked why some students decide that it is worthwhile to
participate in a particular DCLA and others not. In all the DCLAs reported on,
some students were committed enough to complete the deliverables. This
indicates that participation is a very individual decision which is influenced by
outside factors, but also by personal factors. This was not researched in the literature.

As can be seen from the above, participation is an important and complex issue and, although often referred to by the authors in the DCLA literature, it is not the focus of any of the more than sixty research items on DCLAs investigated. My research study reported on in this thesis is specifically aimed at addressing the issue of participation as it was one of the main concerns in the six DCLA cycles at the PETech.

3.6 Conclusion

This chapter reported on an investigation of the research in the literature in the area of DCLAs, covering the reasons for executing DCLAs, the aim and focus of the different research items, co-located collaborative learning, and DCLAs in terms of the aim, the environment they are executed in, the task, student characteristics, the need for online communication via Internet tools, teaming to complete the assignment collaboratively, facilitation by lecturers, assessment and participation. The research items were cited and connections drawn to show the presence of underdeveloped areas according to the synthesised coherence pattern described by Locke & Golden-Biddle (1997). In the process, numerous underdeveloped areas were identified.

As seen in the section on participation (section 3.5.9), research that focuses on this area is seriously lacking and many questions remain on how to ensure student participation in DCLAs. As participation is tightly coupled with the other factors affecting DCLAs, understanding the factors affecting participation also requires an understanding of the factors affecting the success/failure of DCLAs to make them worthwhile for students to participate in.

In the next three chapters the DCLAs executed at the PETech in Port Elizabeth, South Africa, are described. Chapter 4 describes the pre-research, which
consisted of four action research cycles executed over four consecutive years with the lessons learnt applied to each subsequent cycle. The pre-research was abandoned after four years when the cost in terms of additional workload demands became so excessive that the lecturers on the satellite campuses refused to continue to participate. The research was resumed for this thesis with two additional DCLA cycles described in Chapters 5 and 6. The second cycle was deemed to be a success by most of the students with a very high participation rate. The data collected in these cycles, together with the research in the literature, were used for the GGT analysis to develop the perceived cost and reward theory of participation in Chapter 7.
Chapter 4

DCLA: Pre-Research at the PETech

4.1 Introduction

From 1997 to 2000, a four-cycle action research DCLA project was executed at the Port Elizabeth Technikon (PETech) in South Africa. First-year Information Systems I students from two different three-year diploma courses were required to complete a research assignment in cross-campus virtual teams. Each year the cycle was analysed, the problems addressed and the solutions applied to the next cycle.

The research was terminated after four years when the problems experienced resulted in lecturers on the satellite campuses withdrawing from the assignments. The extra demands on their time had increased to such an extent that the costs in terms of time and effort substantially outweighed the rewards. Brown, a lecturer at the main PETech campus in Port Elizabeth, was the researcher and I was a lecturer on one of the satellite campuses that participated in the last three cycles. This chapter describes the DCLAs executed in the four action research cycles, and the lessons learnt, in terms of the aim, environment, task, students, communication, teaming, facilitation, assessment and participation.

The data used for this chapter were a published paper by Thomas and Brown (2001) describing the lessons learnt as seen from the lecturers' perspective; my own observations during the second to fourth cycles; twenty lecturer-to-lecturer emails (1999; 2000); sections of a research document written by Brown (1998); assignment documents distributed to the lecturers and students (1998; 1999; 2000); a lecturer guide (2000); group lists (1999; 2000); documents with evaluation suggestions for lecturers and marking sheets (1999; 2000); peer evaluation forms (1999; 2000); a document with suggestions for improvements set up by one of the
participating lecturers (1999, copy in Addendum C); and final marks assigned to the students.

4.2 Aims

The aims of the DCLAs were to expose students to the use of the Internet to support collaboration; help students gain a better understanding of the cooperative learning environment; promote collaboration where time and place did not restrict the learning environment; improve communication and writing skills; develop the ability to integrate information about a topic found on the Internet into a coherent whole; learn to take individual responsibility while working in a group environment; learn to write well, including writing good HTML; and to teach students how to communicate with people who come from diverse cultures, and have diverse perceptions and academic understanding (Thomas & Brown, 2001). The aims were broad and optimistic and were not attained. The reasons are discussed in more detail in the following sections.

4.3 Environment

Level of virtuality

During the four years that the DCLAs were executed, students on four campuses of the PETech participated, although not all campuses were involved in each cycle. The two main campuses (called PE1 and PE2 for ease of reference in this chapter) are both situated in Port Elizabeth within walking distance of each other. The two satellite campuses are located in East London (EL) and George (G) respectively, approximately 400 km from the main campuses and approximately 700 km from each other.

The first cycle took place in 1997 with PE1, PE2, and EL participating. In the second year (1998) EL could not participate, but G joined. In the third year (1999) all four campuses participated, but EL withdrew at the end of the third year and G
withdrew during the fourth year (2000). This eliminated the distance component of the assignments, resulting in the termination of the DCLAs.

**Course**

At PE1, EL and G, the same three-year tertiary National Diploma: Information Technology (IT) and at PE2 the three-year National Diploma: Financial Information Systems (FIS) were taught. All the first-year students had to complete the same Information Systems I course module which was presented by different lecturers at the different campuses over the years. The module was a year subject running from January to November and had some spare time available that could be used for a DCLA. The module covered general computer concepts and the use of the Internet and Microsoft Word. All the IT students attended an additional module in which they were taught HTML.

**Student population**

The two main campuses together had between 150 and 250 students in the different cycles. They were split into several classes. The satellite campuses had one class each with student numbers ranging between 20 and 35. Dividing these students into teams with members from all class groups and campuses influenced the team sizes and their composition. The problems associated with an uneven distribution of numbers on the different sites are recognised in the literature (see section 3.5.6).

With the large student numbers at PE1 and PE2 the students did not get to know many of their fellow students before the assignment. The situation was different at EL and G, where the small numbers allowed students to become more familiar with each other in class.

The large sizes of the classes at the main campuses influenced the lecturer–student relationship, which was impersonal especially in the first year of study. In contrast, the smaller student numbers at the satellite campuses allowed the
lecturers to build a more personal relationship with each student. This is acknowledged by students who had studied on both a main and a satellite campus. With a more personal relationship it was easier to motivate the students and detect and address non-participation.

**Number of teams**

The requirement that each team had to consist of students from the different classes at the main campuses as well as students from the satellite campuses determined the number of teams that could be formed, with the number of teams growing from 20 to 45 over the four years (in the last year several teams did not have satellite campus members). This growth in the number of teams and students affected the time required for facilitation and assessment by the lecturers.

**Team size**

To ensure that all groups had members from each class group and campus the group sizes were larger than the recommended three to five (see section 3.5.6), ranging from six to nine members over the different cycles. Team membership was uneven with the majority being at PE and in most cases there was only one student from each of the satellite campuses. This was undesirable and is warned against in the literature (see section 3.5.6), but could not be avoided.

**External influences**

Information Systems I was only one of four course modules in the first year. These modules had an equal weighting and consisted of five hours per week, 30 weeks per year, lecture time for each. Students were expected to work on assignments, to study and to practise the skills learnt in the extra time available, but this was not controlled. Although Information Systems I had a relatively light load, some of the other modules were more difficult and required more dedicated work and time. This affected the time students were prepared to spend outside lecture hours on an assignment that had an overall weight of 1 to 2% of the total first year.
The drop-out and failure rate of first-year students was high in comparison to the more senior years. At the G campus the combined drop-out and failure rate was generally between 40 and 50% (57% in 2000) for Information Systems I. This meant that a relative large percentage of the students were not committed to their studies and several left during the year. As teams were set up using alphabetical class lists, most teams had low committed members, with a substantial number of teams losing one or more members during the DCLA. Losing a member without being notified meant that time was wasted trying to locate the member and having to redistribute the work.

4.4 Task

Task type

The assignment covered research on a computer-related topic and the students had to write a Word document and create a website as deliverables. The research topics were computer related and included, for example, object-orientation, security and expert systems. If each student took part in a subsection of each of the research, Word document and HTML sections (IT students), the assignment supported the development of skills in compliance with the aims. Split this way it represented a cooperative assignment (see section 3.5.3) allowing, to some extent, for the five requirements of collaborative learning: positive interdependence, promotive interaction, individual and group accountability, development of teamwork, and group processing (see sections 3.4 and 3.5.3). The individual sections could be assessed for an indication of participation and possibly for individual marks.

Without the right guidance, however, the students split the assignment into a co-located research section, which was executed at the main campus, and the Word document and the website, which were executed at the two satellite campuses respectively. This reduced the distance communication to a minimum, effectively destroying the distributed teaming component. It also minimised the need for
distance communication and, for all practical purposes, removed the virtuality from the assignment. The experiences of each student were reduced to either the research, or the writing and integration skills, depending on which section the student was responsible for.

In the first cycle, all the students in a team received the same team mark, which led to free-riding and the “sucker” effect. To encourage individual accountability five new individual and group documents of intent, progress and peer assessment were included from the second cycle. These had to be handed in at the beginning, during and at the end of the assignment. Although the document of intent required students to commit themselves to the assignment on paper, it did not affect the lack of participation in practice. The first-year students did not have the skills or knowledge to write the progress and peer assessment documents and the way the tasks were subdivided by the students rendered most of the questions irrelevant. The reports had a low hand-in rate and did not promote individual accountability.

**Duration**

Different scheduling options were tried, but each one introduced a new set of problems. Assignments could not be done too early in the year as many first-year students did not have any previous computer experience and did not yet have the skills needed to participate. The time frames later in the year (cycle 1 and 2) did not allow enough time for assessment to be completed, while time frames over the middle of the year (cycle 3) saw many teams losing members as a result of the high drop-out rate at the end of the first semester. The final time frame (cycle 4) ran from March to May; however, some students did not have the necessary skills and students with low commitment were still in the system. Furthermore, the shortened time frame limited the time available for lectures, which was exacerbated by several public holidays.
Time required from students

Students were allowed to work on the task for approximately one to two of the five hours scheduled for lecture time for the module. Same-time-different-place communication during lecture periods was not possible as the timetables on the different campuses were set up independently. Thus, this type of communication had to be organised outside class time, but was difficult with the number of students per team and the number of campuses represented in each team.

Owing to the shortened time frame in the last cycle students had to work on the assignments in their own time outside class hours. Most students did not have Internet access at home and the assignment, with its overall low weighting (1 to 2% of the total first year), received low priority compared to other commitments.

Task organisation

In the first cycle, students were given an assignment document containing their teams, the topics and the due dates; however, no information was given on how to manage the assignments or the team dynamics. This was found to be a serious oversight.

In the subsequent cycles eight milestone dates were given covering the five new deliverables and specifying when the Word document, the peer assessment and the website had to be handed in. No guidance was given on the content of the intermediate deliverables, or on how to manage the assignment or the team dynamics. Owing to a lack of skills for planning and reporting the progress of the intermediate deliverables, the provision of these dates had little effect on the students’ overall task organisation.

The various lecturers were given the responsibility for introducing the assignments on their own campuses. Ideally, this activity should have included explaining the assignment, clarifying the objectives, outlining the procedures, giving examples, reminding the groups of the rules for team interaction, specifying time limits, and
prompting and querying the students for understanding (Barkley et al., 2005). However, with only the assignment document that had been given to the students, some background information copied from Brown’s own research document and no virtual teaming knowledge or training, the lecturers covered only subsections of these topics. It is no exaggeration to say that the lecturers were as uninformed as the students on how to organise the tasks and this led to conflicting information being given to the different team members on the different campuses, resulting in confusion within the teams.

4.5 Students

Maturity

The students involved in the DCLAs were in their first year of tertiary studies and generally in the age group 18 to 25 years. Most of them were new to the less controlled study environment of tertiary education and several lacked self-motivation and effective time management skills. Many did not know what the IT or FIS diploma studies really entailed and these factors contributed to a lack of commitment in a substantial number of students and the high drop-out rate. Most of the teams had uncommitted or non-participating members, especially when the assignment started before the second semester (uncommitted students often dropped out of the course after the first semester).

After the fourth cycle the question was raised as to whether the DCLAs would be more beneficial for more mature students (Thomas & Brown, 2001). It was realised that co-located and virtual teamwork skills did not develop on their own over a short period of time. This is supported by research in the literature (see sections 3.4, 3.5.4 and 3.5.7).

Personality

Students were expected to participate regardless of their personality type. In section 3.5.6 it was shown that not all people have the personality to work in virtual
teams but, in an educational environment, all students have to participate because of the educational value of the DCLAs. Without participation the student would forfeit the marks.

Student background

Computer experience was not a prerequisite for the two courses, thus the first-year students’ computer skills varied widely. It affected the time when the assignment could be executed in the year. If the assignment was executed too early in the year, not all the students had the necessary skills to participate.

Only a small percentage of students had English as their home language, which was the communication medium for the course. The complexity of having to do research on the Internet and communicate effectively in English in a DCLA environment added to the difficulty of the assignment. Although the written communication allowed them to spend more time grasping the content, it also required them to express their thoughts clearly in writing. This problem is also discussed in the literature (see section 3.5.5).

4.6 Communication

Communication tools

All campuses had similar online resources available. These were limited, but included free access to computers, email, shared drives and the Internet (capped). All students were allowed to publish a website that was accessible from the Internet. However, the budget did not allow for investing in a professional collaboration system.

In the first cycle a free tool from Nicenet, called the Internet Classroom Assistant, was used. This was hosted on a server in New York and was accessible twenty-four hours a day. Owing to shortcomings in this system, a customised Internet
Education Support Programme (IESP) was created at PE1 and used in the subsequent cycles (Thomas & Brown, 2001).

The IESP system had several shortcomings, including a dependency on an external administrator to create teams and to correct wrong registrations; allowing students to register in the wrong groups; slow response times on the satellite campuses; being automatically logged out of the system after a short inactive time period and not being able to log in again for some hours; no short-cuts, filters or threads for lecturers to monitor the discussions resulting in time wasted accessing and reading irrelevant communication; and pulled and not pushed information requiring students and lecturers to log in to see whether any communication had taken place. Two months into the fourth cycle of three months duration, all the campuses were still experiencing student registration problems (emails April, 2000). This ultimately led to the G campus withdrawing.

Students were not required to communicate only via the IESP system, but could also use emails and web conferencing. With the IESP problems experienced, students preferred email which had the advantage that students often checked their email during the week; however, this defeated the objective of the IESP system, as lecturers could not monitor communication and participation.

**Communication process**

The large component of PE students in each team could meet face to face. Hence, the research section of the assignment that required communication was kept on the main campuses where it was discussed face to face, and information was passed on to the satellite campus students to set up the final deliverables. Decisions would be taken in co-located meetings without consultation with their remote team members and offers to complete certain sections on the satellite campuses were ignored by the main campus students and replaced by other sections without explanation. For example, hours of completed research by a student at EL were ignored and the student was told to do the Word document.
The way the task was split minimised the need for virtual collaboration and communication, defeating the virtual objectives of the assignment.

The typical advantages and disadvantages of distance communication were experienced (see section 3.5.5): on the positive side the students had a record of communication, and had time to digest written communication, especially the students who were not native English speakers. The disadvantages included the fact that expressing thoughts in writing is time-consuming and requires skill, the time lag between communications (this could be between a few minutes to a few weeks), the loss of discussion threads, misinterpretation and students not receiving emails or denying receipt of emails.

Lack of communication by a student could occur for many reasons, for example incorrect registration on the IESP system; the student not receiving a message; the reply being lost; the recipient not realising that a reply was expected; the recipient intending to respond, but other more pressing demands had to be attended to first; the student not visiting the campus because of being ill; if more than one student resided on the same campus only one of them might have been responsible for communicating via the Internet; or, in the worst case, the student deciding not to participate. Students were not advised about message acknowledgement rules, thus there was no way for the other team members or lecturers to know whether the silence had to be followed up or would resolve itself.

4.7 Teaming

No data was collected on the student's management of the assignment or their experiences. Therefore, most of this section is based on my own experiences as a lecturer and facilitator at the G satellite campus.
Membership

The groups were relatively homogeneous as they came from the same year group and course module; however, they were heterogeneous in terms of motivation, computer experience and commitment to their studies.

Without a prior track record for the students, and with the large numbers of students and campuses involved, it was impossible to assign students to groups on the basis of abilities and skills. Therefore, alphabetical class lists were used to assign students randomly to teams. The result was that some groups had several high achievers, and others consisted of a majority of weaker and/or uncommitted members. Students who were committed to their studies at the G campus felt stressed and cheated when put into teams with predominantly weaker students. There was usually only one G student in a team, and he/she had little control over the quality of the work done at the other campuses (this was also experienced in the literature, see section 3.5.6).

Conflict

The low need for virtual teaming reduced the opportunities for conflict with the students on the other campuses. Although students on the satellite campuses were frustrated by the fact that decisions were made unilaterally at the main campuses without their input, the difficulty in fighting the majority decision by means of email resulted in them accepting the decision, albeit grudgingly. They did complain to their own lecturers, however, who, in turn, complained to Brown. This process was lengthy and Brown could do little to solve the problem apart from reprimanding the students on the main campuses.

When conflict started flaring up at the G campus because the students were being ignored in the decision-making process and because of their lack of control over the assignment, I promised (in desperation) not to let the marks for the assignment count against them in calculating their year marks on condition that they participated.
Goals, rules, roles and responsibilities

One of the main problems was the disparity between the lecturers’ goals and those of the students. The lecturers’ goals in a DCLA are the acquisition of knowledge whilst creating the deliverables. For students, however, the focus is on the deliverables for which they obtain marks. The assignment marks can mean a pass or a fail for the course module, or for the higher achievers and those that needed to apply for a bursary, a distinction or not.

In the randomly assigned teams the members’ goals also did not match. At the one extreme students just wanted to get the assignment done by spending as little effort and time as possible; at the other extreme students aimed for high quality to earn good marks. Most students were somewhere in between, varying in the amount of time they were prepared to spend and the quality they aimed for. These diverse goals resulted in students becoming frustrated with each other’s level of participation.

Students were not given teaming or communication rules and were not required, nor given guidance, on how to set them up. The importance of rules, especially communication rules in a virtual team, is stressed by virtual teaming researchers (Haywood, 1998; Johnson et al., 2001; Pauleen & Yoong, 2001).

The extra intermediate deliverables on intent and progress required team members to assign roles and responsibilities, to assess them and to report on them. The intermediate documents were supposed to specify each team member’s task, the subtopics within the main topic and a timeline for tasks, although the way the group had to be organised was left to the students to decide. By splitting the task early on into research, the Word document and the HTML components, little further task and team organisation was needed. Students did not communicate their strengths/weaknesses or likes/dislikes to each other resulting in tasks being assigned according to location rather than interest, ability or strengths. The need for training and support for students in their first year was recognised, in hindsight,
by Thomas and Brown (2001), which corresponds with experiences reported in the literature (see sections 3.5.6 and 3.5.7).

In a collaborative learning environment the responsibility for learning is shifted from the lecturer to the students (see section 3.4). Students had to manage several aspects, namely, their own and their team members’ motivation to participate; their own and the team’s time; team dynamics; team communication; virtuality; and the quality of the contributions. However, it was found that first-year students do not have the skills, especially not in a distributed environment with minimum lecturer control.

**Leadership**

From the second cycle the students were advised to nominate and appoint a team coordinator. As was experienced in the literature (see section 3.5.6), choosing a coordinator was problematic as the students did not know each other. PE1 and PE2 students tended to choose a coordinator from the students present at the face-to-face meetings in PE, based on first impressions. This disqualified the students from the satellite campuses where some students volunteered but were ignored. In fact, a few teams operated without a coordinator up to the end of the assignment. The importance of a coordinator (leader) has been recognised in the literature (see section 3.5.6) and, in order to simplify the appointment of a coordinator, Brown specified in the last cycle that the student whose birth date was the closest to the beginning of the year had to coordinate the teams. This generally resulted in the wrong person being appointed for the task.

**Quality assurance**

The students had little experience in assessing the quality of their peers' work and in giving objective, promotive feedback. In common with the experiences related in the literature (see section 3.5.6), most of the collaboration that took place on the IESP was limited to sharing unprocessed information and lacked depth. In most
groups, the Word document and the web pages were handed in without the other team members exercising any control over the quality.

**Team building**

From the second cycle, the first milestone in the assignment document specified that the members had to introduce themselves by supplying the team with their names and email addresses. The literature (see section 3.5.6) suggests an initial face-to-face meeting, but this was not possible due to the distances between the campuses. Furthermore, the time frame did not allow for initial teambuilding exercises or orientation where participants could get to know each other.

**Trust**

Trust was limited to trusting that the students (mostly on the satellite campuses) would write the Word documents and create the HTML pages. If the students on the main campuses did not supply enough research material, the students creating the final documents could supplement the research on their own. This trust was not based on any previous actions except, maybe, on the fact that the student showed willingness in his/her communications. The time frame did not allow for redoing any of the deliverables, therefore if they were not done by the individual students, or not done up to standard, the team forfeited the marks.

**Loyalty**

There was a general feeling among the G students that they did not want to let their teams down as this would reflect badly on their campus. This corresponds to findings in the literature (see section 3.5.6).

**Relationships**

Little relationship building across campuses took place due to the way the assignment was split and the subsequent lack of communication.
4.8 Facilitation

Stakeholders

Apart from the students, several other stakeholders were also involved in the assignments. These included the researcher (Brown), her supervisor who was also the Head of the Department responsible for this course module, lecturers on the campuses, and computer support services. EL had a course coordinator who also reported to Brown’s supervisor. As is typical of virtual teams (Duarte & Snyder, 2000; Hornett 2004a), the lecturer at G reported to another internal structure at G.

Level of facilitation

The lecturers acting as mentors were asked to be silent observers and only help if the students were completely confused (Thomas & Brown, 2001). The students were informed that their mentor (team facilitator/lecturer) would not help with the assignment, only with communication problems (specified in an email from the researcher sent to students and lecturers, 23 August 1999). In order to decide when to help and when to stand back, an ongoing in-depth analysis of the communication on the IESP system was required. This was very time-consuming, especially on the satellite campuses with their slow network response times. It was, therefore, often neglected. When students switched to email owing to the IESP problems, the lecturers were not copied in, which left the teams without any lecturer control. Low lecturer involvement is not advised in the literature, as experience has shown that when the facilitator adopts a proactive role student activities increase (see section 3.5.7).

Class facilitation, where each lecturer helped her local students in class time, became the alternative to team facilitation. This meant that, in effect, all teams in the last two cycles were facilitated by all the lecturers. With a lack of clear guidelines, and having to solve problems in class without being able to communicate with the other lecturers, conflicting solutions were offered to different
team members (also reported on in the literature, see section 3.5.7). Students lost faith in their lecturers and the assignment as a whole.

Final lecturer feedback consisted of just giving students their marks. Lecturers were not aware of the need and had not been trained to conduct a guided self-reflection and peer-reflection session with the students. Another feedback opportunity that was overlooked was a class feedback session during which individual experiences could be shared. As each student’s experiences in his/her teams were different, the feedback would have allowed for the spreading of knowledge, equalising the learning experience.

*Multiple facilitators*

Several different facilitation options were tried. In the first cycle Brown, who was the researcher and the lecturer at PE1 and PE2, was solely responsible for the facilitation. The lecturer at EL was only responsible for introducing the assignment and solving problems peculiar to her campus. This occurred mainly during class time and required little additional work by the EL lecturer. The lecturers communicated via email and, if urgent, by telephone. Even with only two deliverables per group Brown’s workload had increased, but was compensated for by her research interest in the DCLAs.

In the second cycle the added deliverables and the growth in student numbers increased Brown’s workload considerably. For example, to the approximately forty team deliverables of cycle one an additional possible 1 000 to 1 500 intermediate deliverables were added. These were short but had to be collated per student to form a cohesive picture of each student’s contribution. Each student’s peer rating covered on average seven to eight other students, creating approximately 1 500 entries in total. Brown needed support in handling the extra workload.

Other lecturers at PE1, who were experts in the research topics, were asked to mentor and assess individuals and teams. Facilitation became an added burden for these lecturers and often received low priority, was executed in an *ad hoc*
manner, differed in intensity according to lecturer, and was often forgotten (they had to sign in on the IESP system). Brown did not have authority over the other lecturers as they were appointed on the same level or higher. Although the Head of the Department could have exerted authority, this could have led to internal resentment towards Brown affecting other course modules. The value of the DCLA was just not worth the costs!

By the third cycle, Brown did not teach Information Systems I any more. Brown and her supervisor thus took a unilateral decision, stating that the Information Systems I lecturers on the different campuses had to share the facilitation. This was not discussed with the lecturers and was also not discussed with the management at G, which was a problem as the lecturer at G was part-time and not compensated for the extra work.

Over and above the problems experienced in cycle 2, added complexities surfaced in cycle 3. The lecturer team was now virtual; no facilitation rules, roles, or responsibilities had been assigned to the lecturers, nor was the lecturer team managed properly. The lecturers assumed that Brown would fulfil the role of leader/coordinator, but without her full involvement the lecturers had to solve problems themselves and solving problems via email was time-consuming. Other complexities included the fact that there were more campuses involved and more students (twenty teams increased to over forty); finding a non-participating student was time-consuming, as there was no list with student names specifying their campus; the lecturers were not experts on all the topics; and facilitation via the IESP system was extremely time-consuming. Nobody had anticipated or addressed the substantial extra time demands that would be made on the lecturers so the lecturer at EL withdrew at the end of the third cycle.

In the last cycle, Brown was on maternity/study leave and no other lecturer team coordinator was appointed. The student numbers had increased once again and the number of teams each lecturer had to facilitate had increased by approximately
40%. The leaderless virtual lecturer team now encountered all the problems experienced in the previous cycle, plus a higher workload in terms of number of teams, a shortened time frame, and even more problems with the IESP system where the lecturers had to administer the system themselves but this function in the IESP still had errors. Problems were solved in an ad hoc manner by whoever came across them first. The lecturers’ dissatisfaction started spilling over to the students and complaints were sent to the Head of the Department at PE1, resulting in even more ill feeling, especially as this was a research project requiring outputs. When the G teams were not registered on the IESP system when the first deliverable was due, the G campus withdrew, although the lecturer continued to facilitate her assigned teams.

The lecturer team is a virtual team in its own right and should be managed as such. Without a coordinator the ad hoc management resulted in wasted time, duplication of efforts, miscommunication, differences in quality, difficulty in facilitating consistently on all campuses, frustration and, ultimately, the premature termination of the research project (emails March and April 2000). Virtual teams in industry have learnt that when distance is added, sound project management and leadership are even more crucial (Haywood, 1998; Brenowitz & Gibbons, 2000; Lipnack & Stamps, 2000; Arnison & Miller, 2002; Conner & Finnemore, 2003; Burtha & Connaughton, 2004; Staples et al., 2004; Horwitz, Bravington & Silvis, 2006; Konradt & Hoch, 2007; Boule, 2008; Curşeu, Schalk & Wessel, 2008).

*Workload*

In accordance with experiences reported in the literature (see section 3.5.7), the complexities of virtual teaming result in a considerable increase in the amount of lecturer time required for facilitation. The lecturers felt that their complaints were viewed as being unfounded and exaggerated and that the increase in time investment needed should have been compensated for. Suggestions to assign a lecturer to the assignment and compensate him/her for the time could not be
implemented owing to a lack of funds. Right at the end, however, just as the G campus withdrew, it was decided to compensate the part-time G lecturer for an extra hour per week (email 20/4/2009). Management still had no comprehension of the amount of extra time that was needed to facilitate the groups properly. The lecturers felt that the goodwill created by participating was costing more than it was worth, especially at the satellite campuses.

Virtual team training

Students needed help with assignment content, task organisation, use of technical tools, the effective use of these tools, group dynamics, and social aspects. In the last cycle the lecturers were expected to train the student team leaders on their own campus, but the lecturers, themselves, were not given any virtual team/virtual team facilitation training. An additional complicating factor in this regard was that the Information Systems I module was an easy course to present, and therefore had a high lecturer turnover (new lecturers were given this course and experienced lecturers moved on to more difficult courses). The new part-time lecturer at G stated in an email on 9 May, 2000: “I don’t know what my duties are – do I go in and ‘check up’ who’s working and who not – how do I judge this? ... I suggest that … [Brown] sets up a document with proper instructions for us …”. As seen in the literature (see sections 3.2, 3.3, 3.4 and 3.5.7), participating in DCLAs requires additional skills in collaborative learning, teaming, virtual teaming and DCLAs.

Expert involvement

In the second cycle lecturers who were experts on the topics were asked to mentor some of the teams. Without a vested interest in the course module or specifications of what was expected of their mentoring role, this option was not successful and was abandoned in the third cycle.
4.9 Assessment

The misalignment of aims and the assessment criteria is a problem in DCLAs. The aims specified for the four DCLA cycles concentrated predominantly on soft skills development (see section 4.2) and the assignment was the tool for learning these skills. The assessment criteria, on the other hand, concentrated on the assignment deliverables. Assessing the soft skills learning would have been very difficult, especially at the remote campuses. Disparity between what was assessed in terms of task deliverables and the real learning aims was also experienced and reported on in the literature (see section 3.5.8).

The way the students split the assignments also impacted on the aim and assessment. Each student participated only in a subsection of the task, that is, research, the Word document or the web page. As the assessment was based on the Word document and the web page and these were generally given to the students at the two satellite campuses, the work of these students mostly determined the marks. Both satellite campuses had students who were academically strong and/or highly committed, but also students who were academically weak or had low commitment. These students could salvage a poorly researched assignment with a good deliverable, or destroy a well-researched attempt. As these deliverables were done shortly before the due date, it was usually too late for the rest of the team to correct, leading to substantial unhappiness among the students whose marks were influenced by one or two weaker team members.

Mark consistency in a multi-lecturer team is difficult to achieve. Each lecturer had to mark their assigned teams’ deliverables and was only given cryptic marking criteria which left a substantial margin for interpretation. In an email (18 April, 2000) the lecturer at PE2 complained that “[t]he criteria used to mark these projects are very subjective”. In the third and fourth cycles, lecturers who were not experts in the assigned topics had to judge the topic coverage quality. This
resulted in large inconsistencies in the marks given, causing dissatisfaction among students. In the third cycle the accusation was made that two assignments of similar quality had received a fail mark from one lecturer (EL) and a distinction from another (PE2) (email 18 April 2000 by lecturer at PE2). In a plea to assign one person to mark all the assignments, the lecturer at PE2 stated, “the students will not tolerate inconsistencies in the evaluation of their projects due to ‘personal differences’ in definition of style, etc”. The assignment mark weight was 10% to 20% of the year mark for the module and it was possible for a student to fail on the basis of personal opinion.

The volume of assessment work, especially with the intermediate deliverables (even though most students did not hand them in), was too much for one lecturer to cope with unless this lecturer’s other workload was considerably reduced. This could not be done as the DCLA assignment was not important enough to the IT and FIS courses to warrant the appointment of a dedicated assessor.

**Mark weight**

It was suggested that the assignment should contribute 10 to 20% towards the year mark, which in turn counted 40% of the final mark for the module. The other 60% was determined by an examination on the module content covered in class. Students had to have at least 40% for the year mark to be allowed to write the examination. On the one hand, 10% was too low to encourage participation from the less motivated students, while, on the other hand, 20% was too high for the students who were high achievers or the students who needed every mark to pass the module. These students felt it was unfair to have their marks influenced by a team assignment over which they had little control. This was especially the case at G where students had little say in their teams.

**Mark distribution**

In the first cycle each group member received the group mark, which allowed for free-riding and the “sucker” effect. The challenge in collaborative learning is to
ensure individual accountability while promoting positive group interdependence (see section 3.4).

From the second cycle the intention of the additional individual and team deliverables were to force students to commit themselves to individual contributions that could be measured by the lecturers and their peers. With an appropriate split of the assignment into subtopics, an individual mark in addition to the team mark would have been possible. This was thwarted by the way the students split the assignment; the inability of the students to create the individual and group documents of intent and progress; and the problems experienced by the IESP system prohibiting the identification of individual levels of participation. The responsibility for assessing individual accountability was transferred to the students in the form of peer assessments. Where the individual documents were supposed to weigh 40%, the team deliverable 40% and the peer assessment 20% (cycles 3 & 4), the final assignment mark was instead composed of a 70% group mark and 30% individual peer assigned mark.

Peer assessment

It was very difficult for the students to assess their own work and that of their peers in terms of quality. The students came from different schools with different perceptions of quality and had little experience in their first year of the university’s expected standards. Understanding quality in an educational setting has a further complication: some students consider a document that receives a pass of 50% to be of high enough quality, whereas other students will only be satisfied with the quality if the marks are 75% or higher. Students, therefore, find it difficult to assess each other’s work objectively without extensive guidelines.

Students had to rate themselves and each other on ten (1999) or seven (2000) questions on a five-point Likert scale and an additional “not applicable” column. The questions covered work ethics and communication of fellow team members. The different ratings were totalled to calculate the peer mark, but this calculation
was complicated by the “not applicable” column which had no value (email 26 August 1999, EL lecturer).

Determining the peer mark was a lengthy process. The peer assessments were done on paper and had to be sorted and delivered to all the campuses. Each lecturer then had to collate her assigned teams’ marks and redistribute the marks to all the other lecturers. This made further demands on the lecturers’ time with little valuable return as the marks were biased and not representative of the effort put in by the different students. For example, some of my students who were committed and had worked hard on the assignment were given low marks.

With the early split and accompanied lack of collaboration, most of the questions on the evaluation form were not applicable and could not be answered by the students. If one student from a campus communicated on behalf of the whole subteam on that campus, the others in the subteam would be rated low by the members on the other campuses. Students who did not participate at all gave everybody in the group a high rating, including themselves. As peer rating counted only 30% of the total mark (last two cycles), a student who did not participate at all and received a zero for the peer mark could still pass if the group mark was high. The adding of the peer rating to the final mark resulted in being as unfair to individuals as giving every member the group mark. In accordance with the literature, peer assessment was found to be biased, not objective and inadequate (see section 3.5.8).

4.10 Participation

The lecturers agreed that the deliverables were generally below the standard expected from equivalent co-located first-year student teams. The lecturer at PE1 commented after cycle 4 (email, 2 June 2000): “Generally I found that the effort made by the students was very poor”. Whether this was due to the difficulties the students experienced whilst doing the assignment, or due to a lack of interest in
the assignment was not researched. No follow-up questionnaires or debriefing sessions were held.

The importance of participation in a DCLA is discussed in the literature study (see section 3.5.9). Unfortunately, low commitment and non-participation was common in our assignments and this caused substantial disruption in the teams and was difficult and time-consuming to resolve, often without satisfactory results. Without observation the lecturers could not identify the offenders and had to wait until one of the students in the team complained. It could be a few weeks before the team realised that someone had not been participating, as there could have been a good reason for a student missing one or two weeks of communication (see section 4.6). The team lists did not specify on which campus the students studied, so the lecturer first had to send an email to the other lecturers, whereafter the other lecturers had to identify the student from their class lists and locate the student during a lecture period. This could take a few days to a few weeks depending on whether the student attended classes. After talking to the student the lecturer had to give feedback to the original lecturer who again had to relay the message to the original student in lectures. No feedback system or rules were in place, so the teams had to proceed without knowing whether to wait for the student or accept that s/he was not participating. The students compensated by taking over the offender’s work, which caused uncertainty and could result in conflict when the offender returned, or resentment if not.

Inequitable participation was a general problem and difficult to detect and address fairly in the assessment (also reported on in the literature, see sections 3.4, 3.5.9, 4.8 and 4.9). The intention of the extra deliverables was to compel students to commit to completing a certain section of the assignment. In reality, however, it only added to the workload of the participating students and lecturers with little success in promoting participation of the free-riders. Students did not feel bound to their commitments and did not necessarily complete the work they had promised
to do. The teams had to either compensate by doing the low participator’s work and letting him/her receive a mark s/he did not deserve, or accept that the team would be punished as a whole for incomplete work or a low quality deliverable. Students voiced their dissatisfaction on more than one occasion and this made them negative towards the assignment; a feeling that was communicated to the new students in the next cycle.

Most students seem to have participated with the aim of handing in the deliverables, rather than to engage in in-depth thought and new knowledge construction. This was evidenced by the way the students split the assignment and by the quality of the deliverables. This was also experienced in the research reported in the literature (section 3.5.5).

When the assignments were handed out, the student groups on the G campus were apprehensive about working with unknown students in a team, especially with the majority of the students being on the main campus. After they had been informed that the marks would not count against them and that they had an opportunity to gain some valuable virtual teaming experience, they showed a positive attitude towards the assignment. The feelings of uncertainty and insecurity subsided and the lack of control became a challenge, rather than a constraint, allowing the students to participate and learn in a less threatening environment. Participation was in class time during the second and third cycle and therefore did not require much extra cost in terms of private time; if they did not participate in the DCLAs they would have had to do a similar co-located assignment anyway. Contrary to my belief that the students would be less inclined to participate (supported in the literature reports where students were coerced into participating by giving a high weight to the assignment – see section 3.5.9), practically all the G students participated, were generally committed and enjoyed the assignment. When G withdrew in the fourth cycle, the G students expressed their
disappointment and asked whether the assignment could be repeated in their second year.

From emails exchanged by the lecturers it would seem that there was a predominantly negative feeling towards the assignment on the other campuses. This was raised at the debriefing session at the PE campus after the first additional DCLA by students who had participated in the last cycle of the pre-research, as it had influenced their decision to participate in the first additional cycle (see Chapter 5). The danger of a negative attitude is that it is passed on to students in the following cycles.

4.11 Conclusion

This chapter described the four pre-research DCLA cycles in terms of the aims, environment, tasks, students, communication, teaming, leadership, facilitation, assessment, and participation. The DCLAs were plagued by many of the problems reported in the literature. It led to the withdrawal of the satellite campuses when the lecturers at EL and G refused to participate any longer; the reason being that the costs for the lecturers on the satellite campuses outweighed the rewards to such an extent that it was no longer worthwhile to participate.

The assignments were more difficult to execute than anticipated. The additional problems resulting from the virtual setting were not anticipated in the early stages of the DCLAs. The conflict between Brown, her supervisor and the other lecturers became intense resulting in the termination of the research. The experiment might not have been a success, but the mistakes made were in themselves a worthwhile learning experience (Thomas & Brown, 2001).

Many suggestions for improvement were made by the lecturers, but only a few were/could be implemented. I reiterated the value of the DCLA; my belief in the assignments; the willingness to participate again the following year if the problems could be addressed; and the disappointment of my students in an email justifying
the withdrawal of the students at G (email 20 April 2008). It was my contention that, if the problems could be addressed, the DCLA could be executed efficiently, effectively and with enjoyment. An investigation of the literature showed that some of the DCLAs reported on were terminated as a result of the problems experienced, but others were regarded as successful and would continue (see section 3.5.9).

One of the intriguing questions arising from the pre-research was the differences in participation and attitude towards the assignment at G and the PE1, PE2 and EL campuses. This was surprising as they did not correspond with the reasons given for participation in the literature (see section 3.5.9). The students were motivated to participate by reasons other than just marks and when the cost (in terms of the possible influence of low marks on the year marks) was removed at the G campus and the perceived rewards (making students aware of the challenge and the learning that can result from the DCLA even if it is based on negative experiences) increased, my students participated and contributed. My first quest was to improve the DCLAs to make them worthwhile to participate in and my second quest was to understand the reasons for participating. The first additional cycle carried out for my research addressed several of the problems experienced in the pre-research. This cycle is discussed in the next chapter (Chapter 5).
5.1 Introduction

The previous chapter described the four cycle pre-research DCLA project executed from 1997 to 2000 at the PETech. The problems experienced resulted in the termination of the assignments and the research. I used the lessons learnt from the pre-research to plan and execute the first additional DCLA cycle, which I coordinated in 2003. This DCLA is described in this chapter and the lessons learnt were applied to the second additional DCLA described in Chapter 6. Although many of the problems that occurred in the pre-research were addressed, new mistakes were made; however, the results were surprising and although not as successful in participation levels and deriving the deliverables as had been hoped for, the students acquired substantial knowledge of virtual teaming.

The data used for this chapter includes a lecturer project plan; an assignment document given to the students (which included a summary of the points deemed important for the management of virtual teams by Martha Haywood [1998]); copies of emails addressed to the lecturer on the main campus and to the students, and return emails from them; observation and interview notes I made during the assignment; student task results and module and course results; peer assessments; 45 student post-mortem reflections (numbered as follows: CS1PE5-27 indicating a student in Case Study 1 from the PE campus, team 5, and a unique student number 27); my own reflections and future plans documented after the DCLA completion; and notes I made during and after the debriefing sessions held on the two campuses that participated. The student post-mortem reflections were
the most important data used as I wanted to determine how the students perceived the assignment and the problems they had experienced. Lecturers were not given access to student communication to keep the communication spontaneous and to eliminate possible effects on the communication brought on by the presence of the lecturers (see section 3.5.5).

This chapter describes the execution of the first additional DCLA cycle in terms of the DCLA components of aim, environment, task, students, communication, teaming, facilitation, assessment, and participation. This is followed by a reflection.

5.2 Aim

The aim of the assignment was to give the IT students experience in virtual teaming with minimal additional lecturer workload. The students generally felt that this execution of the DCLA was a failure because of the problems experienced (described in the sections below), until they realised how much they had actually learnt about the problems of virtual teaming during a debriefing session held at each campus after the assignment (see section 3.4.5 on the value of closing the assignment effectively to turn around negative feelings in collaborative learning). The aim of virtual team learning was met, but the extra lecturer cost was still too high (see section 5.8).

5.3 Environment

Level of virtuality

Two campuses participated in this assignment: the main campus at Port Elizabeth (PE, called PE1 in the pre-research – Chapter 4) and the George (G) satellite campus, both of which offered the three-year tertiary National Diploma: Information Technology. A contingency of students from Botswana were studying at the G campus, increasing the student numbers on the smaller campus.
Course module

The e-commerce module was a third-year course module, running from February to October and was one of four third-year modules. This module was chosen for the assignment as it was taught on both campuses and had spare time that could be used for the DCLA. In addition, the lecturer at PE had also been involved in the pre-research and I was the course lecturer at G.

The module covered general e-commerce concepts including brief sections on value chains, virtual communities and virtual collaboration. The students involved had all had at least two previous years of IT studies, including a module on life skills covering research, problem solving, listening, reading, writing, presentation, communication and teaming. Although experienced on the IT side, the students had difficulty with the business concepts in the module. A collaborative assignment covering value chains would help them to understand this concept.

Student population

At PE 49 students were enrolled for the course module; of these six dropped out of the course just after the start of the DCLA and an additional eleven did not participate in the DCLA. All 20 enrolled students at G participated. Students at each campus were familiar with most of their fellow students at their own campus from their previous studies. Four students had started at G and had moved to the PE campus during the previous two years. The dropping out of students was unfortunate and “annoying” for the remaining team members (CS1G12-44) as it affected team composition and work distribution.

The classes on both campuses were small enough for the lecturers to build some rapport with each student. As the G campus was smaller with fewer lecturers, students had had more contact in previous modules with me than the students on the main campus with their lecturer.
Number of teams and team size

The students were divided into fourteen teams. Originally, team composition varied between two and four members from PE and one or two from G. When the 17 students from PE who did not participate are taken into account, seven teams had two to four PE students and one G student, five teams had two to three PE and two G students and two teams had no PE students. Contrary to experiences in the pre-research, the differences in student numbers at the different campuses (excluding the two teams who had no participating PE students) did not seem to present a problem and only one G student complained about it in her post-mortem reflection (CS1G7-31).

External influences

The four third-year course modules had equal weighting and lecture time, but the extra work required for the other modules affected the time the students were prepared to devote to the DCLA outside class time. Half of one of the modules consisted of a comprehensive final-year project which had to be completed in co-located teams. At PE one of the intermediate hand-in dates of this project coincided with the DCLA final hand-in date (the dates were different at the G campus). These external commitments had higher mark weights and, therefore, were considered more important than the DCLA. Nineteen students complained about this in their post-mortem reflections, for example, “[w]e are third years and so busy with our third year project” (CS1PE5-25); and “[t]he assignment has real bad timing. While I was busy with this assignment, I already had four other assignments, third-year project deadlines, practicals, homework and test to study for” (CS1PE6-29).
5.4 Task

Task type

A carrier task was needed that would allow for virtual teaming; however, in a DCLA the disparity between the carrier task’s deliverables and the learning aims is a problem (see sections 3.5.1 and 3.5.8). The students were more familiar with tasks where the deliverable was important, rather than the life skills that were learnt in the process of deriving the deliverable. In a DCLA, even if a team did not manage to complete the deliverable, the team could still have learnt more about virtual teaming and “what went wrong” than a team that managed to complete a deliverable with minimal teaming problems.

To allow for individual accountability that was directly linked to the aims, the students were given marks for an individual post-mortem reflection in which they had to reflect on their experiences and learning. The danger of a post-mortem reflection document is that the student can whitewash the content. The assignment document warned that an “everything went fine, there were no problems, and teamwork over a distance is easy” would earn them no marks. Insights could only be gained by active participation and would be marked as such. The post-mortem reflections I received seem to have been an honest reflection of the majority of the students’ experiences: they contained positive and negative aspects of the DCLAs, and were consistent with my own observations. I collated the reflections per team to cross-check consistency within teams and found the honesty surprising. This is reflected, for example, in the comment made by CS1PE4-14, who admitted that he had not worked hard on the project, had not pulled his weight and “I don’t deserve any combined group mark”. The post-mortem reflection documents had the added advantage of compensating for my lack of observation and could be used to identify problem areas to make improvements in the next cycle.

A task that tests collaborative learning has to allow for interdependency, but also for individual accountability (see section 3.4.2). With a lack of observability,
participation levels are difficult to determine. To analyse communication was not a viable option as it is not deemed successful in the literature (see section 3.5.8) and the extra demands it would make on lecturer time were unacceptable as the weight and importance of the assignment did not justify the extra costs. The alternative was a task that included identifiable group and individual components.

The task set for this assignment required the team to collaborate on developing an industry value chain for a specified industry. Industry value chains were not readily available and the students had to decide collaboratively on the different units in the value chain. Then each team member had to choose a different link of the value chain to develop individually into a strategic business unit value chain. Afterwards the information had to be collated into one cohesive Word document, as well as a PowerPoint presentation that could be presented at both campuses. Unfortunately, owing to difficulties experienced at PE, the presentation was replaced by a poster, eliminating the need for each student to become familiar with the work done at the other campus and for a combined class feedback session.

Several problems were experienced, which are represented by the following comments:

- “Complexity of the subject matter” (CS1G1-2).
- “The project definition was not clear …” (CS1PE2-22).
- “The project scope was too broad” (CS1PE2-22).
- “Finding books in the library was not successful and searching the Internet was even worse” (CS1PE3-1).
- “Not interesting topic …” (CS1PE7-21).

Although industry value chains were covered in the textbook, discussed in class on both campuses, and the students had written a test on them, the students still experienced difficulty understanding them.
Unfortunately, the assignment document was not clear enough on exactly what was expected of the industry value chain and the individual links in the value chain. This resulted in different interpretations on the two campuses and was only discovered during a NetMeeting session a few weeks into the assignment. Although it was decided to allow both interpretations, the PE students felt uncertain and frustrated and this was one of the aspects criticised by practically all the students in their post-mortem feedbacks (CS1PE6-29, CS1PE7-17, CS1PE11-39, CS1PE11-40, to name but a few). Students blamed the lecturers for lack of planning and coordination and used it as an excuse to stop participating (see section 5.10). Finding a balance between an over-specified assignment, thereby reducing the need for communication and reducing uncertainty, and an assignment requiring communication, but which could leave the students uncertain and frustrated, was difficult.

Industry virtual teams have found that more frequent deliverables are needed to allow for misinterpretations to be caught and corrected before work is done unnecessarily (Haywood, 1998; Suzuki, 2001). If the value chains had been handed in for assessment during the assignment it would have been easier for the students to continue to the next step of assigning the individual links (confirmed by CS1PE9-3), although the increased deliverables would have had the disadvantage of adding to the workload of the lecturers.

**Duration**

The time frame for the assignment was ten weeks, running from the end of February to the beginning of May. It was longer than a similar co-located assignment, but had to compensate for the time lag in communication, especially since the timetables of the two campuses did not overlap. The time frame also contained several public holidays which had an impact on the number of class periods the students could work on the assignment. The result of the longer time frame was that students started losing momentum and interest. One student
commented that he became “lazy and tired of it” (CS1PE12-43) – a sentiment I shared towards the end. In their reflections students generally stated that a shorter, more intense period would have been better, as they had many other responsibilities in their third year. When some students ran out of time for collating contributions and finalising the assignment (last minute working), they requested an extension of the hand-in date. This was denied as it was time to move on to other learning experiences. An interesting comment by CS1PE9-3 was that the length of the time frame gave students the impression “that it was an overwhelming task … [i]t is not something we have the time to do considering the weight of the mark we receive”. Balancing task, communication needs and mark weighting with time proved to be difficult.

*Time required from students*

Students were allowed to work on the assignment during some of the lecture hours set aside for the e-commerce module; however, the different timetables on the different campuses did not allow for same-time-different-place communication during lecture periods. Students generally worked on the assignment once a week during these lecture hours and missed out on regularity if the class time was on a public holiday. This required students to invest extra time outside of class hours, but other external demands generally had higher priority and students returned to the DCLA only when delivery dates were looming. As stated by CS1G12-44, “… most things normally get done soon before the deadline”. The objective of a longer time frame to allow for asynchronous communication was defeated by teams trying to complete the deliverables at the last minute.

*Task organisation*

A comprehensive assignment document was set up giving the goals, names of lecturers, explanation of the deliverables, references to the textbook, project responsibilities, assessment weights, technical tools to use, the teams, as well as a two-weekly schedule breakdown containing milestones and subtasks. An
additional nine-page document was added containing a summary of “important project management techniques that could make or break a virtual team”. This was based on recommendations by Martha Haywood in her book *Managing Virtual Teams* (1998) and covered the advantages, disadvantages, important virtual communication practices, virtual team building, remote management skills, ways to organise a distributed team, and network technologies.

Each lecturer handed out the assignment to her own class and gave a brief explanation of what was expected. I was the lecturer at G, which enabled me to explain the assignment and the purpose in detail to my students. This was not the same at the PE campus where the lecturer was not involved in the research and not trained in virtual teaming. This was one of the reasons for the comprehensive assignment document.

The long assignment document proved to be a problem, as in general the students did not read the document properly. This was admitted to by some of my students during interviews, and also showed in the deliverables which did not comply with the specifications. The reason for this was ascribed to students not being used to long assignment documents, and not wanting to invest time in reading a document for an assignment with a low mark weighting (discussion with Dr R Gerber of the Educational Department at the PETech). This document might also have influenced the students’ attitude towards the assignment, giving students the impression that it was an assignment that would require a substantial amount of time for few marks.

### 5.5 Students

**Student maturity**

The students for this cycle were in their third year of a three-year IT diploma. Having passed two years of IT studies indicted a certain level of commitment towards their studies.
Initial enthusiasm/attitude

Some students at PE had participated in the 2000 pre-research cycle and believed it would again be a waste of time (negative influence of past experiences – see also section 3.5.9). Student CS1PE4-14 ascribed his lack of interest to: “I assumed it was going to be like that again”, but lamented that he “probably lost out on a nice experience”. This sentiment was communicated to the rest of the class at PE and voiced in the debriefing session. The G students again showed a positive attitude towards the assignment (see section 4.10).

Although some PE students still showed enthusiasm for the assignment, others did not. The G students quickly noticed the general lack of interest at the PE campus; for example G student CS1G1-2 claiming that his fellow G student was enthusiastic, but that the PE students were not. In his team only the G students finally handed in a deliverable. G student CS1G12-44 also claimed that “[t]he lame excuses I have heard make me thankful that my group is a functional one”. Such excuses were made to G students by some PE team members and discussed in class at G.

Personality

As in the pre-research, students were expected to participate regardless of personality (see sections 3.5.4 and 4.5).

5.6 Communication

Communication tools

The weight of the assignment did not warrant the extra costs of a specialised collaboration tool, nor did the time frame allow for training in the use of such a tool. Email is a popular communication medium in virtual teams in industry (Lipnack & Stamps, 2000; Dustdar, 2004; Neece, 2004) and was the most commonly used tool in the DCLAs described in the literature (see section 3.5.5). As email was freely available to all the students and lecturers, it was decided to rely mainly on
this mode of communication for the assignments. This was not regarded as a limitation when the assignment was planned as Duarte and Snyder (2000) claim that the success/failure of virtual team projects can hardly ever be ascribed to the technology itself, but is rather attributable to the processes that take place, and Lipnack and Stamps (2000) reckon that 90% of success is attributable to people and only 10% to technology.

Students were encouraged to use alternative communication methods. Very few were used due to lack of familiarity; difficulty in setting them up and lack of administration rights on computers; a university firewall prohibiting the use of certain tools; and difficulty in organising same-time-different-place communication. Lacking a scanner, students could not share previously typed documents or hard copy graphics unless they had access to a scanner outside the PETech (CS1G6-30).

Email proved to be inadequate in sections where students had to agree on the value chain needing intensive communication in order to brainstorm (aggravated by the misunderstanding about the task at the two different campuses). One NetMeeting chat session was organised by adapting the G timetable. Although limited bandwidth prohibited the use of voice or video, the typed chat feature allowed students to make progress and the session was very productive. In the post-mortem feedbacks students remarked on how much they enjoyed this session as it taught them a different way to communicate. The lecturer at PE remarked in an email: “... they had a lot of fun experiencing the technology”. Students could not use NetMeeting in their own time, however, as it required the help of Computer Services to sidestep firewalls.

Students were recommended to simulate corporate memory by sharing documents in a folder on a shared drive; however, they did not use this option as the amount of information exchanged was relatively small and could be emailed. The shared
drives were also campus specific and the limited bandwidth affected the access times from the other campus.

*Communication process*

Four modes of communication were used. The first, same-time-same-place communication, occurred between the subteams of co-located students on a campus; between students in a class on a campus; and between the lecturer and her class on a campus. The second, same-time-different-place communication was limited to one NetMeeting session and, if matters were urgent, telephone calls. Thirdly, different-time-same-place communication occurred mainly when emails were sent to other students in the subteam and/or the lecturer on the same campus. This included the sending of documents, requesting support and/or providing feedback. The fourth mode, different-time-different-place communication occurred when students communicated within their teams across campuses using emails; PE students contacted me as the coordinator using emails although this was minimal; students emailed the deliverables to me; and I gave feedback to the students at the PE campus via email. Although students at PE had my email address they preferred to raise issues with their own lecturer. Problem solving could have been streamlined had they been prepared to speak directly to me, but they seemed to avoid the unknown.

Most student teams did not specify, or adhere to, the communication rules of availability, acknowledgment and prioritisation. They also did not implement rules to ensure that the communication that was received was understood and acted on. This was due partly to the fact that they had not read/understood the virtual teaming project management summary that was given to them (see section 5.4), and had not realised the importance of having communication rules. It allowed some students to avoid responsibility by claiming that they had not received emails (CS1G1-19) and to omit or delay responses (CS1G11-42; CS1PE13-18). After
experiencing these problems some of the G students acknowledged the importance of using the rules, but still did not implement them.

The typical advantages and disadvantages of email were experienced (see section 3.5.5). On the positive side, students accessed their email regularly; had a record of their communications; and had time to digest written communications and phrase their responses. On the negative side, most of the students could not access email from home; the email system broke down once during the assignment resulting in undelivered email; expressing thoughts in writing was time-consuming and required skill (for more than half of the students English was not their first language); and the time lag between communications resulted in loss of thinking and discussion threads influencing response times and the inclination to respond (time lags could be more than a week with the public holidays). Misinterpretations occurred with student CS1G13-13 claiming that “fairly simple messages were often misunderstood and led to work being done or redone unnecessarily” and “I made a point of being as concise as possible, and still I was often misunderstood”.

The need to be at a computer to communicate resulted in a loss of information that was either not communicated, as it was not regarded as important, or it was forgotten. This was especially prevalent in lecturer–lecturer communication where a lecturer would have to act spontaneously in class, but could only communicate with the other lecturer once back in her office.

5.7 Teaming

Membership

Students were assigned to teams using an alphabetical list of student names from the two campuses. This resulted in some teams having more diligent and stronger members and others less committed or academically weaker members. The students were homogeneous in certain respects as they were all in the third year
of their IT studies, but were heterogeneous in other aspects such as academic ability and commitment, as well as race and gender. This was in line with the experiences in the literature (see section 3.5.6)

*Conflict*

Although substantial disagreement occurred in the teams as a result of the different interpretations of the assignment at the two campuses (see section 5.4), rather than argue about issues the majority of students either accepted suggestions from team members without arguing; worked around them if possible; just ignored suggestions made by students on the other campus; or stopped participating (teams 1 and 10 – only the G campus students handed in a local deliverable; teams 4, 8, 9 and 11 – PE and G handed in different deliverables). The low level of overt conflict corresponded with experiences in the literature (see section 3.5.6).

*Cultural differences*

Students were a cultural mix of English, Afrikaans, Indian and African (Setswana, Xhosa, Tswana, North Sotho, Batswana). Because certain cultural groups tend to be grouped in alphabetical lists, care was taken to ensure that groups had, as far as possible, a cultural mix of students. None of the students mentioned that culture affected the teaming. After having studied successfully at the PETech for at least the two previous years, the effect of their cultures seemed to have been minimal.

The reason for the G students being more motivated to participate was, at the time, ascribed to the difference in culture between the PE campus, with its large classes, and the G campus, with its relatively low student numbers (see also section 4.3). This conclusion was shown to be incorrect in the second cycle (see section 6.6).
Goals

The learning goals were given in the assignment document, namely, to acquire and exercise technical knowledge (value chain), distributed teamworking skills and soft skills (research, problem solving, presentation, teamworking, communication and writing). For the students, however, the main goal was to complete the deliverables, as these were the measurable outcomes of the assignment and would be allocated most of the marks. For example, student CS1PE9-10 stated that “the team should have a common goal, and in our case we had different ideas of solving the problem … it’s very difficult to come up with a good output at the end of the day”.

Reaching the common deliverable was difficult owing to the different interpretations of the assignment (see sections 5.4 and 5.8). Student CS1G6-30 complained about the time they had wasted due to not having a clear objective. What the students had not realised at the time was that they had learnt about the importance of stating clear goals in a virtual team and the difficulty of trying to accomplish this over a distance. This is a common theme in industry virtual teaming research in the literature (Haywood, 1998; Bal & Gundry, 1999; Lipnack & Stamps, 2000; Brenowitz & Gibbons, 2000; Duarte & Snyder, 2000; Chinowsky & Rojas, 2003; Conner & Fennemore, 2003; Tucker & Panteli, 2003; Powell, Piccoli & Ives., 2004; Staples et al., 2004; Hossain & Wigand, 2004; Horwitz, Bravington & Silvis, 2006; Hambley, O’Neil, & Kline, 2007; Bergiel, Bergiel, & Balsmeier, 2008; Curşeu et al., 2008).

The problem of disparate quality goals existed on both campuses. Student CS1PE8-32 learnt that “not everyone has the same standard of work … some of the links I received were really well done, and others were not”. Most students just regurgitated information without spending time on assimilation or constructing knowledge. Several individuals blatantly plagiarised, even though the content did not match what was required for the assignment. This caused frustration and
unhappiness in the more diligent students who found this aspect difficult to handle. Student CS1G13-13 mentioned that “[w]hen the time came to discuss the subject matter, my team members had practically no understanding of the subject matter whatsoever” and “[w]hen the first group member sent me his write-up, I realised they still had no clear idea of what we were supposed to do”. He realised that his team members had not put any effort into acquainting themselves with the work for the assignment.

**Rules, roles and responsibilities**

The summary of the virtual team project management given to the students as part of the assignment document (see section 5.4) addressed *rules, roles* and *responsibilities* and contained recommendations for controlling communication, team-building processes, ways to measure team effectiveness, remote management skills, ways to organise distributed teams, and ways in which tasks should be divided into collaborative and individual sections. Many students did not read the document properly and there was no evidence that students had applied any of the rules.

**Leadership**

Teams were not required to appoint a team leader. If the leadership role had been formalised, it would have been difficult to compensate the team leaders fairly for their contributions. If the leader was required to lead in addition to the normal individual workload it would have had to be taken into account in assessment for additional marks. If the leader had been excused from the individual link, as was also suggested by student CS1PE11-40, s/he would have had to be assessed on different criteria for an individual mark.

Choosing a leader within the team was difficult without knowing the team members on the other campus (see also section 3.6). Student CS1G12-12 summarised the general way the leaders were appointed as follows: “In my group (as with other
people’s groups), I found that it is usually the person that spoke the loudest and first that was deemed group leader.” In most teams it was usually a G student who initiated the contact and started the coordination, and therefore became team leaders “per default” (CS1G5-8), or “assuming” it (CS1G12-12) although this was not necessarily official (CS1G1-19, CS1G2-24). Typical tasks the leader had to perform were to motivate members, assign tasks, avoid duplication of work, combine documents, track progress, keep everybody informed, and make sure everything was handed in on time (CS1G8-34, CS1G9-37, CS1PE11-40). The importance of assigning a leader right from the start was recognised in hindsight by several students (CS1G1-2, CS1G8-34).

Quality assurance

Two of the team leaders experienced firsthand the problems associated with a lack of feedback from fellow team members (teams 5 and 12). Members assumed that what the team leader had suggested was correct when the leader had, in actual fact, made a mistake (CS1G12-12, CS1G5-8). Team leader CS1G5-8 equated his role as leader to a dictatorship. This was partly ascribed to the fact that the team leaders were from G and students at PE assumed that my students would have the right information (CS1PE6-29, CS1PE13-18). In addition, several PE students had hoped to complete the deliverables by spending as little time and effort as possible, as they regarded the assignment as a G initiative and had decided to let the G students do most of the work (discussed in the debriefing session at PE).

The assignment comprised individual and combined sections. The individual sections were not usually checked by fellow team members and when the team leader CS1G12-12 checked his team members’ work and informed them that their work was not up to standard and had to be redone, he was criticised for being arrogant and having an attitude. Students had not been taught how to give or accept constructive feedback from each other, as they were used to lecturers providing feedback.
Team building

An initial face-to-face meeting could not be set up due to logistics and costs, so students had to rely on emails and one NetMeeting session to build team relationships. In virtual teams in industry, an initial get-to-know-you session is highly recommended for building trust and rapport (Haywood, 1998; Brenowitz & Gibbons, 2000; Duarte & Snyder, 2000; Powell et al., 2004; Hambley et al., 2007; Peters & Manz, 2007). Students recommended an initial face-to-face meeting, a video conferencing meeting or a chat room session (CS1G1-19; CS1PE6-16, CS1G9-37). Student CS1G12-12 reckoned that communication, reaching consensus and sharing information would have been easier and they would have felt more enthusiastic towards the assignment had the other members been more than just a name.

Team management

Only four teams managed to team successfully (Teams 6, 7, 12, 13). They had committed members who communicated and completed their tasks on time; they accepted contributions made by the other team members and came to an agreement on the value chain to use; and they managed to hand in a quality combined document. The other teams’ deliverables showed limited or no evidence of collaborative work. Four teams handed in separate deliverables (Teams 4, 8, 9 and 11) and, in two teams, only the G students handed in deliverables (Teams 1 and 10).

Without visual cues students could not track the progress of other team members. Some of the students had “a sense of urgency about them”, but not all (CS1PE8-32). Tardy workers increased the stress levels of the other team members, and teams had difficulty deciding whether to wait for the deliverables (CS1G3-4), or whether the students were no longer participating. Last minute deliverables could also not be checked for correctness (CS1G3-4) and some tardy workers could not complete their links in time for the final delivery date (team 12).
Students were reluctant to report non-contributing students to lecturers as they felt it would affect the relationship between them and the other team members (CS1G3-4). When members stopped communicating it was often assumed to be for an acceptable reason and that they would resume communication when ready. When the due dates came closer and there was still no communication, the remaining members had to make emergency arrangements to compensate for the offenders’ inputs.

Students did not have any background knowledge of the students on the other campus, other than that they were in their third year of IT study. They found it unnerving to have to rely on team members of whose work ethics they knew nothing. In the same class, if student numbers are not too large, students form some idea of what to expect from fellow students and how to compensate for skills that are lacking (CS1G12-44). In the DCLAs, students tried to gain some of this knowledge by analysing communication patterns, such as prompt communication, giving feedback and delivering quality work on time.

Some students felt a greater sense of responsibility to their team members than others. “I was not only accountable to myself, but was accountable to an entire group” (CS1PE8-32). A similar sentiment was expressed by CS1PE6-16. This was surprising in a DCLA, as it was expected that with fewer opportunities to build relationships, team loyalty would be low (see also section 3.5.6).

Trust

Trust had to be formed swiftly due to the short time frame. This was needed when students had to rely on fellow team members to deliver on their promises, that they would adhere to a certain quality standard and that they would not lie when they reported on their progress or stated whether or not they had received emails (CS1G3-4, CS1PE2-23). Not having the time to develop trust, students found it problematic to know when, how and where to intervene and how much extra work, support, prompting or explanation would be needed. Without trust more controls
have to be implemented and contingency plans made (CS1G1-2). In virtual teams in industry, trust is an oft-discussed topic as it is seen as the glue that holds the team together (Ratnasingham, 1998; Kimble, Li, & Barlow, 2000; Pauleen & Yoong, 2001; Johnson et al., 2001; Fernández, 2004; Pauleen, 2004; Hertel, 2004; Hossain & Wigand, 2004; Hambley et al., 2007; Bergiel et al. 2008; Hunsaker & Hunsaker, 2008).

High trust is a double-edged sword, however, as it can result in time and money saved, but also in costly disappointments (Fernández, 2004). The students experienced this when students who had communicated well in the beginning faded during the assignment (often unintentionally). When team members did not deliver their individual work for the combined deliverable by the due dates, the remaining students had to make emergency plans.

*Relationships*

The time frame of the assignment was too short to allow for prior relationship-building exercises. In addition, students spent too little time on the assignment to develop more than superficial relationships across campuses. Nevertheless, new on-campus relationships were built in PE (mentioned by two students in Team 5).

In the beginning student CS1G12-12 felt that knowing a person’s name would be enough. This would prevent stereotyping and he felt it would enable a better working relationship. After meeting his PE counterparts during the NetMeeting conversation, however, he realised that it had improved his working relationship with the PE students as he felt he could now relate to them.

**5.8 Facilitation**

*Facilitators*

The PE e-commerce lecturer and I as the G e-commerce lecturer facilitated the DCLAs at the two campuses. We had both been involved in the pre-research
cycles and were aware of the problems experienced. I, with my research interest in the DCLAs, acted as coordinator. We both believed in the value of the DCLA for the students, although the PE lecturer had little to gain personally by participating in them (her participation was mostly as a personal favour to me, as we had worked together before and had met face-to-face on several occasions at departmental strategic planning meetings). This differed to most research reported in the literature where the lecturers at the different campuses involved with the DCLA also had an interest in the research (see section 3.5.7).

Participating in the DCLA carried a high risk for the PE lecturer. If the DCLA failed the PE lecturer could lose face with her students, and if the students complained to her line-manager it could have had undesirable repercussions for her. Although her initial Head of Department was also my initial research supervisor, this changed when she emigrated shortly after the start of the research and was succeeded by a new Head of Department at PE who had no interest in my research. I, on the other hand, reported to a different structure at the G campus that also had no interest in the research. In the literature the importance of buy-in by the organisation in industry virtual teaming is emphasised by several researchers (Kimble et al., 2000; Duarte & Snyder, 2000; Hornett, 2004a, 2004b; Hossain & Wigand, 2004; Wong & Staples, 2004). If the PE lecturer and I encountered conflict and could not resolve it between us it would have meant the end of the research. Fortunately, we had a strong relationship built on trust and the PE lecturer was prepared to participate and trust me with the coordination of the DCLA. She also gave valuable input into certain aspects of the DCLA.

Computer Services on both campuses were asked to help when needed on an ad hoc basis. During the NetMeeting session, students had to bypass the firewalls. This had not been anticipated and the help of Computer Services had to be summoned at very short notice. Fortunately, the support personnel at both campuses had a good relationship with the lecturers and were prepared to help immediately.
Level of facilitation and workload

The substantial additional time required to facilitate the DCLAs is discussed in the literature (see section 3.5.7) and was one of the main reasons for the failure of the pre-research (see section 4.8). The DCLAs were not a major component of the IT course and, therefore, for the DCLAs to be viable and sustainable the extra lecture load had to be minimal. It was decided to limit facilitation predominantly to lecture times with minimum additional time requirements.

Although my set-up costs for the first additional cycle were relatively high, it was hoped that most of the documentation could be reused in the following cycles with minor changes. The cost of this was offset by my interest in the research in this cycle.

The assignment document was relatively comprehensive to minimise the need for lecturer facilitation. Each lecturer introduced the assignment to her own class and solved problems and motivated students as needed. This occurred mainly during lecturing hours with lecturer-to-lecturer communication taking place after lectures. Facilitation mostly consisted of ensuring that resources were available and accessible to all students, finding non-participating students, advising on teaming problems, resolving assignment misunderstandings, and collecting deliverables. No lecturer lurking of communication or monitoring of processes occurred (see section 5.4).

Students recommended more lecturer monitoring, especially checks on student contributions (CS1G1-19, CS1G4-5, CS1G9-1, CS1G9-37, CS1G10-38, CS1G14-45). More lecturer control might have improved the quality of the deliverables, but it could have reduced the virtual teaming experience by pre-empting many of the typical virtual teaming problems that were experienced. More control would also have required more lecturer time. Balancing control with the DCLA aim of virtual teaming learning and lecturer costs was difficult.
Multiple facilitators

Initially, lecturer management seemed to be relatively simple with only two lecturers involved. I set up and planned the DCLA with suggestions from the PE lecturer on the type of assignment and the deliverables. We communicated via email and the odd phone call if the matter was urgent. The time delays involved in email were not serious as students did not have class every day and the lecturers generally processed their emails at least once a day.

I sent the assignment document to the PE lecturer to initiate the assignment on her campus. Unfortunately, the assignment document, although comprehensive, still lacked clarity on what was expected from the students, resulting in different interpretations at the two campuses. This was not realised until some weeks into the assignment when teams could not come to an agreement on the requirements of the assignment. Eventually the lecturers decided to accept both interpretations, as siding with one lecturer’s interpretation could have discredited the lecturer who was “wrong”, and the cost of this would have been too high for the value of the assignment. This did, however, cause several teams to split with each division following their own lecturer’s interpretation (CS1PE8-32, CS1G8-35, CS1CS1PE9-3, CS1PE9-10, CS1PE9-36, CS1G11-42). In other teams the PE students took the pragmatic approach of accepting the G interpretation, assuming that my students would have the correct interpretation as I was coordinating the assignment (CS1PE6-29). Nevertheless, the dual interpretations caused confusion, uncertainty and dissatisfaction (CS1PE5-28, CS1PE9-10).

The lecturers also differed in other areas. As they could not confer with each other during a lecture period, but had to make impromptu decisions in their classes, such decisions were not always communicated to the other lecturer as they were deemed unimportant or they were forgotten by the time the lecturer reached her office. The students criticised this severely in their post-mortem reflections, as they perceived it as a lack of proper planning and communication between the lecturers (CS1G8-34, CS1PE12-5, CS1PE13-18, CS1G14-45). Several students at PE
decided to use it as an excuse not to participate any further. Munkvold and Line (2002) had similar experiences where students in a team were given different feedback by two lecturers (discussed in section 3.5.7). They tried to solve this in their next DCLA by assigning specific teams to a specific coordinator.

It is a great responsibility to be entrusted with access to another lecturer’s students, especially at a distance. None of the research in the literature addresses this issue. The DCLA could have led to ill feeling between the PE lecturer and me, which would have been a high cost as we had to work together on course modules again in the future. Fortunately this was not the case, but influenced the way the lecturer team was coordinated in terms of taking measures to avoid situations that could cause conflict.

*Virtual team training*

Participating in and facilitating DCLAs require additional skills in collaborative learning, teaming, virtual teaming and DCLAs. Owing to my research interest, I was the only lecturer involved with the DCLA with the necessary knowledge. The PE lecturer’s only contact with DCLAs had been during the pre-research cycles and she could not be expected to spend time on virtual team training if it was not her interest and the DCLAs were not a necessity for the IT course. I therefore acted as coordinator and set up the assignment and the teams, assessed the students, gave feedback and conducted the debriefing session on both campuses, with valuable input from the PE lecturer.

Instead of formal training in virtual teaming aspects, the students were given the virtual team project management summary. This was done because the PE lecturer would not have been able to train her students and I would have had to do the training on both campuses which was impractical. Unfortunately, few students read the document (see section 5.4).
Debriefing session

As I was located at the G campus, many of the problems the students experienced could be discussed and put into perspective during the assignment, thus the debriefing session with my own students was relatively short. The 90-minute debriefing session I had face-to-face with the PE students, however, was more encompassing. The meeting started with most of the students showing aggression and voicing their negative attitude towards the assignment. As the majority of the problems they had experienced were typical virtual teaming problems also experienced in industry, I could show them, using their own complaints, how much they had learnt about virtual teaming. When they realised this, their attitude changed. This had a profound effect on the next cycle (see also section 3.4.5 and Chapter 6).

5.9 Assessment

Apart from the few PE students who had studied at the G campus, none of the other PE students had met me before and it was important that they trusted that I would not give preferential treatment to my own students. Although the original intention was that both lecturers would be involved in the assessment, the PE lecturer and I decided that it would be more consistent if I assessed all the deliverables. This was not in line with the recommendations made in the literature (see section 3.5.7), which state that the local lecturer should grade her own students. As many of the PE students had lost interest compared to the G students, who had put in a substantial amount of effort, it might have appeared that I was giving my own students higher marks. Fortunately, the PE students admitted in the debriefing session at the PE campus that the G students had worked harder.

Defining the quality expected of the deliverables was difficult. Experience had taught us that quality expectations differ from lecturer to lecturer (see section 4.9). Students learn about the quality a certain lecturer expects through rumours,
experiences with previous assignments, tests, examinations and discussions in
class and adapt accordingly (confirmed by discussions with students and
lecturers). As I conducted all the assessments and the PE students were not
aware of my quality standards, this raised the uncertainty level for them.

I could follow up discrepancies between the DCLA mark and the student’s normal
performance at the G campus, but not at the PE campus. When the PE lecturer
received complaints from some of her students she referred them to me in an
email and accepted my justification for the marks.

I gave the students general feedback, which was emailed to all the students, and
team-specific feedback, which was emailed to all the members of the team. This
was more comprehensive than usual because I could not give the PE students
verbal feedback (feedback was given after the debriefing sessions and the
assessment). This took a considerable amount of time and added to my workload.

Mark weight

The assignment counted 10% of the module’s year mark, which counted 40%
towards the final mark for the module with the examination mark counting 60%. A
question on value chains was included in the exam, but could only form a very
small part of it. This meant that the weighting of the assignment in the total module
mark was 4%.

The weight of the mark seemed insignificant for the amount of work expected.
Student comments included “[t]he project took too much of our time and I feel it
should be given more marks” (CS1PE5-27), and “unfortunately to a student, the
effort we put into a task is directly proportional to the weight of the mark for that
task” (CS1PE9-3). It is very difficult to balance the time and effort expected from
the student with the mark weighting. The virtual aspect required extra time, but
giving the assignment a higher weighting would have been unfair for students who
had little individual control over the quality of the DCLA deliverables (see also
section 3.5.3).
Mark distribution

The discrepancy between the need for a carrier task and the aim of teaching virtual teaming skills was present in the assessment. Seventy percent of the marks (35% for the individual value chain links and 35% for the collaborative value chain) were for the carrier task deliverables, and only 30% for virtual teaming skills (post-mortem reflections). The mark distribution supported the students’ focus on the deliverables instead of the virtual team skills learning.

Owing to their collaborative learning component, DCLAs need to have individual and group accountability (see section 3.4). A substantial portion, that is, 65% of the weight of the mark was assigned to the two individual deliverables. Individual sections solve some problems in the ethical assignment of marks, but also lessen the need for virtual teaming. However, in order to be given an individual link, the students had to collaborate and the post-mortem reflection could only contain the required depth if the student had experienced the team dynamics. The group mark was given unaltered to each team member for the other 35%. Individual contributions to the group mark could not be ascertained, although individual students were able to influence the quality of the group deliverable, affecting each team member’s final mark. The PE lecturer adapted the mark distribution when the assignment marks affected her student’s final marks adversely, but the marks at the G campus were left unchanged.

This DCLA had three deliverables, each contributing three or three-and-a-half marks towards the year mark and less than one-and-a-half mark each towards the final module mark. Each additional deliverable would dilute the marks even further at high cost to the student and the lecturers. As was seen in the pre-research (see section 4.9), the rewards were low in terms of the effort and a balance had to be maintained between reward and effort.
Peer assessment

The lack of observability made it difficult for the students to assess each other fairly and, although the students were all in their third year of study, they lacked experience in assessing the quality of fellow students’ work. Of the 46 students who filled in the peer assessments, 15 gave each team member equal ratings, and 16 gave the member(s) of the other campus lower ratings (five of these were in a group that had split according to campus). The only peer marks that were somewhat representative of the true contributions were those made by the team leaders, as individual contributions were channelled through the leader. In some teams one student at a campus would do the majority of the communication for the subgroup at that campus. Those that did not communicate were rated lower, although they had contributed their fair share to the subgroup. The marks from the peer assessment were not used in the final marks for the DCLAs. This confirmed the problems experienced with peer assessment in the literature (see section 3.5.8).

5.10 Participation

Students had to participate in order to learn virtual teaming skills. All twenty George students participated, but eleven of the remaining 43 PE students did not participate and several only half-heartedly. Justifications for the lack of commitment given by the PE students included: CS1PE4-14 who admitted that he hadn’t worked hard on this project due to his first-year experience; CS1PE6-29, CS1PE9-3, CS1PE12-5 and CS1PE12-43 who blamed the long time frame for their lack of enthusiasm – “you end up not putting in a special effort to give in the best assignment you could hand in” (CS1PE6-29); CS1PE9-10 who claimed that “[a]t first I couldn’t realise why we had to do the assignment, because I thought it was going to take our study time”; CS1PE13-18 who blamed the unclear assignment, contending that “had I known from the beginning what was expected of us, my quality of work would have been better and I would have been more
interested in making the project a success”; CS1PE3-1, CS1G9-1 and CS1PE13-11 who expected that the assignment would be complicated; CS1PE5-27 and CS1PE9-3 who blamed the low mark weight; and the feeling that it was a G initiative, so deciding to let the G students bear the brunt of the work (stated in the debriefing session at PE and evidenced by the fact that the G students had to initiate and coordinate the assignment in practically all the teams). The most common reason given was external work requirements (CS1PE4-20, CS1G5-8, CS1PE5-25, CS1PE5-26, CS1PE6-29, CS1G8-35, CS1PE9-3, CS1PE12-5, CS1G12-44). As commented by CS1PE5-28 “time is a big problem for a 3rd year student, as there is (sic) deadlines that have to be met … which means that not enough time could be spent on the combined project as what (sic) should have”. The importance attached by the students to the aspect of external requirements is interesting as it is not raised in the literature (see section 3.5.2).

Although several PE students participated half-heartedly, some were enthusiastic as shown by comments such as “participation from all members was great” (CS1G8-35); “[w]hile the general buzz of most of the class members that they where (sic) having most difficulty (sic) communicating and getting the project started, our group was the first to contact us via e-mail” (CS1G9-37); and “I was lucky to have gained a group that was willing to work” (CS1G12-12).

Student commitment was generally low. The students focused on the deliverables, rather than on engaging in in-depth thought and new knowledge construction, resulting in a generally below expected quality value chain section. Knowledge construction would have required extra time which most of the students were not prepared to spend on the assignment. Most students just regurgitated information they had found and several individual links were plagiarised. Whether students thought they would get away with it, or just had a low interest in the assignment was not determined.
Contrary to the quality of the value chains, the quality of the post-mortem reflections was high. Students generally spent time setting them up and considering their arguments. Many of the comments made were surprisingly honest and ranged from positive to negative. It seemed as if they were not going to waste one of the few chances they were given to express their opinions on an assignment. Only a few lacked insights and depth, but all were original. I am indebted to the students for many of the insights that are presented in this chapter.

Students’ perceptions of the assignment varied. Negative comments included that the DCLA was a waste of time and effort, not interesting, a failure/disaster, not enjoyable, a negative experience, a misuse of time, and that it elicited a negative attitude towards distributed teamwork projects (CS1PE4-20, CS1G4-5, CS1G5-8, CS1PE5-25, CS1PE8-32, CS1PE9-3, CS1PE9-10, CS1PE9-36, CS1PE12-5, CS1PE13-18). On the other hand, a substantial number of the students stated that the DCLA should be continued, albeit rather in the second year of their studies, as it was a success, worthwhile, a “great idea”, interesting, a challenge, educating, a valuable learning experience, enjoyable, and that it had prepared them for the real world (CS1G2-24, CS1G3-4, CS1PE5-26, CS1PE7-17, CS1PE8-33, CS1G8-34, CS1G8-35, CS1G9-37, CS1G10-38, CS1PE11-40, CS1G11-42, CS1PE12-43, CS1G12-12, CS1PE13-7, CS1PE13-11, CS1PE14-9).

5.11 Reflection

The students who had participated had acquired substantial knowledge of the problems associated with virtual teaming. Unfortunately, the participation rate and commitment level at the PE campus were generally low for reasons that included unfamiliarity with me as the coordinator so they preferred communicating with their own lecturer; feeling that it was a George initiative and that it added more work to an already demanding third year; negative past experiences in the pre-research; the impression that it was a big task with a low mark weighting; the vague assignment document leading to different interpretations at the two campuses; the
complex task and uncertainty as to what depth the task had to be executed; losing focus due to the long time frame and other commitments; and other course demands with higher mark values competing for time.

The G students, on the other hand, knew me from previous courses; accepted from class discussions that the assignment was not so demanding; understood the aim of the task; had a more positive view of the pre-research; and were not so unsettled by the different interpretations because I was the coordinator and I was on their campus. In addition, vague aspects could be clarified quickly and easily; George students were appointed as team leaders and drove the assignment which meant that they did not lose focus so quickly; and they had a different schedule for some of the other course demands.

Some of these issues could be addressed in a new DCLA cycle. Firstly, the debriefing session had changed the negative attitude towards the assignment by showing the students how much they had actually learnt. Secondly, the different interpretations at the two campuses could be pre-empted by a clearer, assignment document, although a balance would have to be found between under- and over-specification. Thirdly, the topics for the value chains could be more specific and an example could be given of what was expected. Fourthly, I could, as coordinator, introduce the assignment at both campuses and explain what was expected, give students some virtual team training, and explain the aim of the assignment to change the focus from the deliverables to the virtual team learning (assessment would have to be adapted as well to reflect the focus). A personal introduction would also make me more familiar to the students on the other campus. Fifthly, the time allowed for the assignment could be reduced, but still be balanced with the extra time required for distance communication. Finally, the timetables at the two campuses could be synchronised to allow for more NetMeeting sessions in class time.
Some problems could not be addressed, however. Firstly, the low mark weight for
the assignment could not be increased as students' module marks might be
substantially affected by an assignment they have little control over, raising ethical
issues. Balancing the mark weighting and the extra time and effort demands of a
DCLA remained difficult. Secondly, the external demands on student time made by
the other course modules could not be reduced for the DCLA. Thirdly, the
differences in facilitator advice would persist as long as there was more than one
facilitator. Fourthly, assigning a leader in the teams was found to be important, but
making it official would result in assessment difficulties, as the team leaders would
have to be assessed on different criteria for their individual marks. Fifthly, the IT
students enjoyed learning about additional online communication tools, but
including more tools was difficult owing to time and monetary constraints and the
university firewall blocking chat type applications. Sixthly, the request for more
lecturer control was not viable. Extra demands on lecturer time had to be kept to a
minimum to make the DCLAs worthwhile, especially since the lecturer at the PE
campus had very little to gain personally by participating. Seventhly, the students
suggested moving the DCLA to the second year where the workload was smaller.
The maturity of the students was important, however, and the second years did not
generally have the same level of commitment to their studies as the third years.
Finally, an initial face-to-face meeting to foster relationship building in the teams
could not be organised as it had cost implications.

Most of the problems experienced in this DCLA supported the findings in the
literature (see Chapter 3), but a few interesting results did not agree. In this DCLA
the differences in student numbers at the two campuses did not seem to pose a
problem. Furthermore, the demands made by other course modules were a
common complaint from students as this affected the time they had available to
spend on the DCLA; however, this is not mentioned in the literature. The literature
also does not address different attitudes towards the assignment on different
campuses, nor the problem of how to compensate the team leader.
This DCLA had value in that the problems the students experienced resulted in a high level of understanding of the issues affecting virtual teams. The DCLA was successful in addressing the aim of teaching students virtual teaming skills, albeit with a high level of frustration and at the cost of a reduction in quality of the deliverables of the carrier task. The question could be asked whether removing the problems and reducing the frustration levels of students would impact substantially on virtual team knowledge acquisition. Where does the balance lie?

5.12 Conclusion

In this chapter the first additional DCLA cycle carried out in 2003 at the PETech, was analysed and the insights gained on the factors affecting DCLAs were discussed in terms of the aim, environmental influences, the task, the students participating, distributed communication, teaming aspects, facilitation, assessment, and participation. This cycle followed the four 1997 to 2000 pre-research cycles and addressed some of the problems experienced in the pre-research. Although new problems were experienced (e.g. high time demands for low marks weighting; relative low participation rate at the PE campus; the lecturers interpreted the assignment differently confusing the students; and external time demands with higher priorities), the results were promising as the students had acquired substantial knowledge of virtual teaming. The extra time required from the lecturers was also reduced considerably.

The knowledge gained from this DCLA cycle was used to plan a second additional cycle executed in 2004. This cycle is discussed in the next chapter (Chapter 6). Several of the factors causing dissatisfaction in the first additional cycle were improved and, although not all the problems could be addressed, a favourable set of circumstances allowed for a DCLA that had a high participation rate and was described as successful by most of the participating students.
Chapter 6

DCLA: Second Additional Cycle at the PETech

6.1 Introduction

In the previous chapter the first additional DCLA executed in 2003 at the PETech was analysed. This DCLA was more successful than those in the pre-research in that the aim of virtual team learning was largely satisfied and the additional demands on the lecturers’ time were not as high. Although I still had to invest time in managing the DCLA, it was hoped that the groundwork could be reused in future cycles with minimal changes. Unfortunately, the assignment still contained several problem areas resulting in low participation and commitment levels from the PE students.

Several of the problems that were experienced could be addressed to streamline the DCLA further (see section 5.11). In 2004, a second DCLA cycle was planned and three weeks were set aside for the assignment to coincide with the PE lecturer’s absence from her campus. The assignment would solve a problem for her in that her students would be kept busy with coursework during her absence, and the problems caused by multiple facilitators would at the same time be eliminated. This cycle would be valuable for my research in that, although several factors were the same, the DCLA would be executed under very different circumstances.

To our great surprise all students but one participated. Seventy-nine percent of the students who filled in a questionnaire after the completion of the DCLA (73% return rate on the questionnaire) felt that the assignment was a success. This was contrary to all our expectations as it was assumed that, without the lecturer’s
presence at the PE campus, commitment to the DCLA would be lower than in the past (see section 3.5.9). The circumstances of the DCLA were by no means perfect as we could not address all the aspects that had caused dissatisfaction in the first additional cycle. Still, the combination of factors seems to have been balanced to such an extent that the students felt it was worthwhile to participate. Several of the previous beliefs on reasons for participation (see sections 3.5.9, 4.10 and 5.10) were disproved. Trying to understand the factors affecting participation in the DCLAs led to the generation of the PCR theory for participation presented in Chapter 7. The second additional cycle is discussed in this chapter.

The same types of data items collected for the first additional cycle were collected for this cycle (except that no debriefing session could be held afterwards at the PE campus). Additional items included: answers to four open-ended questions in the peer ratings covering the duties of the team leader and the communication rules used in the teams (completed by 52 of 60 students); a thirty-minute test covering value chains and virtual teaming aspects that was written after the deliverables had been handed in (written by 58 students); and a questionnaire with 58 five-point Likert scale questions and 8 open-ended questions filled in by the students after the completion of the DCLA but before distribution of the marks (returned by 43 students). The results of the Likert scale questions of the questionnaire are summarized in Addendum B. In the remainder of this chapter the percentages calculated from the Likert scale questions are based on the 43 students who handed in the questionnaire, not the 59 who had participated (one student of the 60 students did not participate). It can, therefore, be assumed that there might be some biases in the percentages. For the “agree” percentages in the discussion the two highest levels of the Likert scale were summed, and for “disagree” the two lowest levels.

This chapter describes the execution of the second additional DCLA cycle in terms of the DCLA components of aim, environment, task, students, communication,
teaming, facilitation, assessment, and participation. This is followed by a summary of the students' perception of the DCLA and a reflection.

### 6.2 Aim

The aim of this assignment was the same as in the first additional cycle (see section 5.2), namely, to teach virtual teaming skills within the confines of the carrier assignment which covered an e-commerce content topic (value chains).

In terms of participation the assignment was a resounding success. Only one student of 60 did not participate. Questionnaire results showed that 79% agreed that the assignment had been a success, 67% that they had enjoyed the assignment, 74% that it was an efficient way to learn about value chains, and 79% that it was an efficient way to learn about virtual teams. Most comments in the post-mortem reflections were positive, including comments such as “interesting” and “fun” (CS2PE2-7, CS2PE5-23, CSPE8-37, CS2G9-42, CS2G10-47), “pleasant”, “great”, or “rewarding” experience (CSG4-19, CS2PE5-23, CS2PE6-26), “exciting” (CS2PE10-46), “great project” (CS2PE4-18), “a welcome change to our otherwise regular schedule” (CS2G6-29), “I thoroughly enjoyed this project” (CS2PE12-56), “highly recommended” (CS2G11-54), and that it was a valuable experience for the third-year project later in the year (CS2PE10-45).

Although more students learned about virtual teaming owing to the higher participation rate, the average depth of individual student virtual team learning was less than in the first additional cycle. By removing some of the problems experienced, the need for student virtual teaming was correspondingly reduced.

### 6.3 Environment

**Course**

Although the same e-commerce course module was chosen, the time period of this module had been halved to a semester with little reduction in course content.
This made it difficult to justify spending time on the DCLA. Fortunately, the PE lecturer was due to be absent from campus for two and a half weeks and we were able to use that time which would otherwise have been filled with other e-commerce assignments. In future the DCLA would have to be moved to a different course module.

The same lecturer was teaching the module at PE as in the first additional cycle. I was no longer teaching the module at the G campus, but a new part-time lecturer who had no virtual teaming training, but had participated in virtual teams in industry.

**Student population**

G had 21 students and PE 39 (one of the 39 did not participate). With the assignment running slightly later in the semester, there were no student dropouts thus stabilising team membership.

**Number of teams and team size**

Twelve teams were set up with nine teams having three or four PE and two G members and three teams with three PE and one G members. A few students on both campuses were repeating the module after having failed the previous year.

**External influences**

The external workload was the same as in the first additional cycle, but the shortened time frame helped students to stay focused on the DCLA. Contrary to the first additional cycle, only a few students mentioned the external workload as being a problem (CS2G9-42, CS2PE11-50, CS2G11-53, CS2G11-54). CS2PE10-45 added that it had a positive result as it taught him better time management.
6.4 Task

Task type

The students again had to develop a value chain, but the topics were narrowed to specific products. The deliverable was changed to a website with the value chain links linking to the individual student’s web pages containing the corresponding business unit value chains. Students had to collaborate in the beginning to decide on the value chain as well as a web template for the site, then complete the links individually, and finally combine them collaboratively into a seamless end product. Students again had to write individual post-mortem reflections. Some students rated the task as too difficult and others as too easy (open-ended question in questionnaire). Two students found the topics interesting (CS2PE2-7, CS2PE11-50), but most found them boring, preferring an IT-related topic (CS2G1-4, CS2PE4-16, CS2PE4-17, CS2PE5-23, CS2G7-34, CS2PE9-41, CS2PE10-43; CS2PE10-45; CS2PE12-56).

Duration

The assignment was shortened to a three-week time frame running from mid March to the first week of April. The test, peer assessment and questionnaire were executed in the fourth week. In the questionnaire about half of the students reckoned that the time frame was right with a few feeling that it was too long and a few that it was too short. Some students requested one more week (CS2G9-42, CS2G12-59). The relatively short time period forced students to work quickly and professionally and stay focused on the assignment (CS2PE1-2). One student commented that had it been longer he would have started to relax (open-ended question in questionnaire).

Time required from students

One of the problems in the first additional cycle was that the DCLA had to compete for time with other course work. With the absence of the PE lecturer, PE students...
could work on the assignment during the full four hours per week set aside for the e-commerce module. The G students were given time in class to work on the DCLA, although not the full four hours. Owing to the short time duration of the DCLA in this cycle, students had to work on the DCLA in their own time as well. As a result of a number of last minute workers, several of the website developers had to work extra hours at the last minute (CSPE2-6, CS2G3-14, CS2G5-25, CS2PE7-33, CS2G8-38, CS2PE9-41).

Task organisation

To compensate for the unclear and confusing assignment document in the first additional cycle, the document was extended with additional task information. This included an explanation that the purpose of the assignment was to give students a virtual teaming experience; it warned that it was not an easy task and the outcomes in terms of the quality of deliverables could be less than expected; stressed the importance of email acknowledgement rules; and suggested that students had to be honest with team members when introducing themselves to allow fellow team members to form an idea of their abilities and attitudes towards the assignment. Students were also given an example of an industry value chain and a business unit value chain. A schedule was included which specified the major activities the students had to concentrate on during the three weeks. When students complained about the length of the assignment document a shortened version of two and a half pages was distributed that summarised the main points and schedule.

Student perceptions of the extended assignment document varied with contradictory comments. Some students found the document to be adequate and clear, others that it was unclear and should have been more detailed (open-ended question in questionnaire). Although 58% felt that the assignment document gave a clear description of what was expected, practically half of the students handed in an incorrect business unit value chain regardless of the example included in the
document. Team leader CS2PE9-40 wondered “whether my members had actually read the handout that was given us”. Only 21% of the students specified in the questionnaire that the document was too much to read, but this percentage might not be representative. Several of the students, as in the first additional cycle, had not read the assignment document, but expected that the team leader inform them about the details of the assignment.

I initiated the assignment at the PE and at the G campus. During the briefing/training lecture the information that was in the assignment document was summarised and discussed and important aspects highlighted. Students were warned not to expect all to go smoothly, but that this was part of the learning experience.

6.5 Students

Enthusiasm/attitude

Contrary to the first additional cycle, the PE students generally showed a high level of enthusiasm. Thirty of the thirty-nine PE students attended the initial meeting and most PE students participated in the first NetMeeting session regardless of the fact that their lecturer was not on campus. In the post-mortem reflections students commented that they felt enthusiastic (CS2PE2-6, CS2PE9-40), were interested (CS2G3-14, CS2PE11-50), started off positive (CS2G7-34), were willing to work (CS2PE8-37, CS2PE10-46, CS2G10-47), looked forward to it (CS2PE4-16, CS2G12-60), were struck by the willingness of team members to cooperate (CS2G3-15), and “[f]rom day one everyone was enthusiastic about the project and couldn’t wait to begin” (CS2PE11-49). The surprisingly positive attitude was also noticed by the students. CS2PE6-26, for example, stated that “[i]t was really surprising that everyone wants to work hard for the project”.

Students who had started with a negative attitude commented on how they were pleasantly surprised and how they had enjoyed the assignment. Reasons for their
CHAPTER 6  DCLA: Second Additional Cycle at the PETECH

initial negativity included having to rely on others for their marks (CS2G9-42, CS2PE10-45); thinking that it would be easy and a waste of time (CS2PE5-23) or boring (CS2PE9-41); and having to work with strangers (CS2PE11-50).

6.6 Communication

Communication tools

A NetMeeting session was planned for the first and third week of the DCLA (the second week had a public holiday). The G timetable was synchronised with the PE timetable to allow for an 80-minute same-time session per week. Unforeseen circumstances prevented the support person at PE from helping the students with both the Netmeeting sessions. Without observability, substantial time was wasted trying to determine why the person was not there and how to get the session going with telephonic help from the G campus. This unfortunately created the impression that the sessions were badly planned. Several PE students left the second session missing the much-needed synchronised communication. This incident was severely criticised in most of the post-mortem reflections.

IT students enjoy learning to use new IT tools (CS2PE1-1). Communicating via the NetMeeting sessions was again found enjoyable and 72% of the students felt that there should have been more time devoted to them. Some students felt that they had made substantial progress during these sessions which could not have been made using email alone (CS2G6-30, CS2PE8-35). On the other hand, the NetMeeting sessions were not always used efficiently (CS2PE1-2, CS2G4-19, CS2PE5-23, CS2PE10-45, CS2G11-54, CS2PE12-56), and the lack of communication threads was confusing (CS2PE1-2, CS2PE2-7, CS2PE11-49, CS2PE12-57). Low bandwidth did not allow for voice transmission, and firewalls did not allow for the use of NetMeetings outside the two scheduled times. Sixty-six percent of the students did not feel that virtual meetings using NetMeeting were less productive than co-located meetings.
A few teams tried alternative communication methods such as chat programs, forums and message boards, but did not get support from their team members. As experienced by CS2G4-20, it was difficult to find a technology everybody could use in a short time.

Communication process

In this cycle the value of availability, acknowledgement and prioritisation rules was emphasised in the assignment document and the initial meeting. In four of the teams no acknowledgement rules were used and in the other teams rules more appropriate for the shorter, focused time frame were agreed on, namely, that all emails were of high priority and had to be replied to as soon as possible (teams 4, 7 and 8); senders had to specify the date and time a reply was expected (team 6); members had to check emails daily (teams 11 and 12); and information had to be sent to all (teams 2 and 10). Unfortunately, members often broke these rules and although they were not adhered to, 67% of students agreed that acknowledgment and 65% agreed that prioritisation rules for email are crucial for successful virtual teaming.

In the initial meeting students were made aware of the problem of misinterpreting emails and a few mentioned how they were more careful with their responses (CS2PE1-2, CSPE6-28, CS2PE9-41). Although some misunderstandings occurred (CS2PE1-2, CS2PE1-3, CS2PE4-17, CS2PE6-26, Team 12), 66% of the students did not feel that their emails were misinterpreted and 79% felt that they had not misinterpreted emails that were sent to them.

In the questionnaire, 49% of the students felt that they did not stereotype people on email content whereas 28% admitted that they did. Communication patterns, amount of typing, interest shown, being proactive, and content were used to try and determine who would be committed workers (CS2G5-25, CS2PE8-35, CS2PE8-36).
6.7 Teaming

Conflict

Some conflict occurred in team 10 (the way the team leader was chosen and the team leader’s autocratic style); team 11 (members not communicating work distribution); and team 12 (member not attending the NetMeeting sessions and misinterpretation of emails). These were resolved by the students deciding to accept what had happened and to move on. They realised that conflict is costly to resolve over the Internet (more costly than the reward of winning the argument), but they also had time to think about the disagreement due to email delays. Practically half of the students (49%) felt that members seem to be more agreeable in a virtual team than a co-located team.

Cultural differences

The lower commitment on the PE campus compared to the G campus in the first additional cycle was partly ascribed to the differences in culture at the two campuses (see section 5.7). To our surprise students at both campuses displayed similar commitment patterns in this cycle. For example, only one PE student did not participate; one G student did not write the test; on both campuses some students did not hand in their post-mortem reflections and/or did not fill in the questionnaire; and some students on both campuses plagiarised or did the wrong business unit value chain. Although the numbers for PE students were slightly higher than the approximately 2:1 ratio of students at the two campuses, it must be taken into account that the PE students worked with little on-campus supervision, whereas the G lecturer and I were present at the G campus. This contradicted the findings in the literature that campuses without a lecturer present showed a marked lower participation rate than the campuses with a lecturer present (see section 3.5.9).
In terms of perception of quality, 42% of the students agreed that the members on the two campuses had the same concept of quality, although quite a large percentage (28%) disagreed. This was not campus related.

Goals

In the first additional cycle the students focused mainly on attaining the deliverables, rather than the virtual team learning aims. The students were made aware of this in the initial meeting and in the assignment document. Although greater weight was assigned to the virtual team learning than in the first additional cycle, the value chain deliverables still carried 57% of the marks compared to 43% for virtual teaming. The focus on the final deliverable remained, with CS2G3-15 stating, for example, that the assignment felt good because they had a satisfying final product, and CS2G1-4 stating that with a longer time frame they would have had better deliverables. On the other hand, most of the students commented in their post-mortem reflections on their virtual team learning.

Students still had disparate quality goals (CSG1-4). They were advised at the initial meeting and in the assignment document that some students aim for 50% and others for 80% but that both were acceptable, as long as this was communicated to the team. This honesty was new to the students, because when one student informed his group that he was not a hard worker the other members were taken aback at first but glad that they had been told (CS2PE9-41). The individual sections counted 75% of the final DCLA mark, making it easier to compensate students with marks in line with their individual quality goals and lessening the effect students could have on each other’s marks. This did remove some of the incentives for virtual teaming, though.

Leadership

In the questionnaire, 89% of the students indicated that having a team leader was crucial to the assignment, and 65% felt it was more important to have a team leader in a virtual team than in a co-located one. The importance of a good team
leader was also mentioned in the post-mortem reflections (CS2PE1-1, CS2PE4-18, CS2G4-19, CS2G6-30, CS2PE7-33). Teams who delayed appointing a leader found it difficult to make decisions and allocate work, thereby wasting valuable time (teams 4, 6 and 11).

Incorporating the role of the team leader was crucial, but presented a problem. If the team leaders were exempted from completing an individual link they would have to be assessed on other criteria for an individual mark. This was discussed with the students at the initial meetings, but the students still opted for a leader who would also be responsible for the website and assessed as such. In two teams (teams 5 and 8) this ruling was overturned without my knowledge when the leader at PE completed a link, but a team member at G was the webmaster. I had to adapt the assessment rubrics to make provision for the different options.

When students had to choose a leader they realised how difficult it was without knowing their team members. This corresponds to the experiences in the literature (see 3.5.6). A variety of methods were used, with members disagreeing on which was the best (open question in the questionnaire). The methods included: a member volunteering because s/he wanted the experience (teams 10 and 12), because nobody else volunteered (teams 6 and 7), or after some prompting (teams 1 and 2); a member being nominated because s/he showed initiative, sounded confident, took charge, had the best marks, or strongest leadership characteristics (teams 2, 3, 4, 9 and 11); a member having previous project management experience (team 8); being chosen by eliminating those who were not interested (team 9); a PE student being chosen because there were more students at PE, and they either decided without consulting the G students, or outvoted them (teams 5, 8 and 11); and a main team leader at PE and a sub-leader at G (team 5) were chosen who communicated across campuses and with the students at their own campus. In half of the teams the students felt unanimously that the best person was chosen and in only two teams did they feel that the leader was not the best person for the job. In nine out of the 12 teams the
team leader received the highest, or close to the highest, mark for the DCLA. Contrary to the first additional cycle where all the team leaders were from G, in this cycle eight leaders were from PE and four from G, reflecting the campus student population ratio for the course module of approximately 2:1.

The main role of the team leader was to coordinate, monitor and control the assignment, to help and motivate members, and to manage the teaming process (open-ended question in peer assessment and discussed in several of the post-mortem reflections). This pivotal role played by the team leader resulted in members becoming overly dependent on them in some cases (CS2PE1-3, CS2PE9-40). Members were content to let the leader dictate their tasks to them (CS2PE2-6, CS2PE4-17, CS2PE10-46), which reduced the need for virtual teaming and virtual team communication considerably.

**Quality control**

Only team 6 managed to set up a good value chain with good individual links. Teams 1 and 2 had a good value chain with one individual link not up to standard, while several other teams had a good value chain, but at least half of the students had substandard individual links. The quality of the content of each link was the individual students’ responsibility, with the webmaster only having to ensure that the overall look and feel of the website was consistent. There was, therefore, not much need for students to assess each other’s contributions unless requested to do so by fellow team members.

In teams 1, 5, 10 and 12 the leaders checked the quality of individual links and insisted that members redo them if below standard. The leader of team 10 (CS2PE10-45) complained that the students “rushed it”, and the leader of team 12 (CS2PE12-56) that the students were “lazy” and had plagiarised. About half of the students (49%) agreed and about a quarter (28%) disagreed that it was more difficult to ensure quality from team members in a virtual team than a co-located team.
Team building

Students again felt strongly that an initial face-to-face meeting should be included, even if it was via video conferencing (CS2PE1-2, CS2PE2-8, CS2G2-9, CS2PE6-26, CS2G6-29, CS2PE7-33, CS2PE9-40, CS2PE9-41, CSPE12-58, CS2G12-59). Several students preferred knowing more about their team members to determine which students were committed, what the members’ strong and weak points were, and what they could expect from individual team members (CS2PE1-2, CSG5-25, CS2PE7-31, CS2PE8-37, CS2G10-47, CS2PE11-51). This feeling is confirmed in virtual team research in industry where face-to-face meetings are used to build rapport (Haywood, 1998; Duarte & Snyder, 2000; Pauleen & Yoong, 2001; Suzuki, 2001; Chinowsky & Rojas, 2003; Powell et al., 2004; Pauleen & Rajasingham, 2004; Hossain & Wigand, 2004; Hambley et al., 2007).

Two-thirds of the students did not find it difficult to start communicating with strangers on their own or the other campus. However, they found it more difficult to assign work to people when they could not read their body language (56% agreed).

Team management

Having subteams at each campus allowed for face-to-face communication. In some teams, however, students at PE were taking different course modules and did not necessarily meet face to face. Less than half (44%) of the students agreed that the member distribution affected the effectiveness of the assignment by allowing the students to meet face-to-face, and only CS2PE8-35 and CS2G9-42 mentioned it in their post-mortem reflections. There was disagreement on whether more of the team’s communication was done face-to-face than with students at a distance (32% agreed and 40% disagreed). This depended on the task type and the way the task was split into collaborative and individual sections. The initial collaborative section was done together by most of the team members during the first NetMeeting session, thereafter the individual sections required little
collaboration (co-located or distributed). The final combining of the individual sections into the website only required communication with the team leader/webmaster (CS2PE2-6, CS2G3-15, CS2PE4-17, CS2G4-19, CS2G4-20, CS2G9-42CS2PE11-50, CS2G11-53, CS2G12-59, CS2G12-60). CS2G1-4, CS2G3-14, CSPE5-23 and CS2G5-25 commented on the way the task became individualised after the initial collaboration and CS2G5-25 commented that “I would try and change the concept of the project so that students are forced to communicate in a better virtual team manner”. On the other hand, in several teams students helped each other with the individual sections (CS2PE6-27, CS2PE6-28, CS2E8-37, CS2PE9-41, CS2G10-47, CS2G10-48, CS2G12-59). The lowered need for virtual teaming did impact negatively on reaching the aim of the DCLAs, namely, virtual team learning.

Owing to the short time frame, students could not spend much time on debating decisions that had to be taken. In the more democratic approaches the members brainstormed the options together, or discussed a suggestion and either agreed or voted. In most teams, however, the team leader was instrumental in making the decisions, either with or without input from team members (open-ended question in questionnaire). This did not always result in the best decision being made, however.

Lack of communication and not communicating every decision to all members resulted in students duplicating research (CS2G12-59). The importance of communication for the success of the DCLA was stressed by CS2G4-19, CS2PE8-37 and CS2PE9-41. Interestingly, approximately half of the students felt that the problems they had experienced were not a result of being virtual, but were rather typical to group assignments.

**Trust**

The large individual component allowed students to receive substantial marks for the assignment regardless of the contributions of their fellow team members. This
minimised the importance of, and need for, trust. Only 42% of the students agreed that the assignment had given them experience in ways to build trust with team members they did not know.

**Relationships**

In several teams the first NetMeeting session was used to get to know the other team members by exchanging personal information and discussing social topics (teams 1, 4, 7, and 11). This brought forth mixed reactions: whereas some saw this as invaluable (CS2PE8-37), others were dissatisfied as they felt that the time should have been used for more productive work (CS2G1-4, CS2G7-34). Only 53% of the students agreed that it was important for the success of the assignment to get to know the members on the other campus through personal information and photos. This experience is mirrored in virtual team research in industry where researchers mention the importance of relationship building, but several virtual team members insist that building relationships takes time and is not necessary (Pauleen & Yoong, 2001; Holton, 2001; Hossain & Wigand, 2004; Hertel, 2004; Powell et al., 2004; Nandhakumar & Baskerville, 2006). A few students expressed their disappointment, however, at not being able to make friends owing to the short time frame prohibiting socialisation (CS2PE10-43, CS2PE10-46, CSPW12-57, CS2G12-60).

Slightly more than half of the students felt that they would not keep contact with their team members after the assignment. The fact that some relationships had been built only became evident the following year; G students studying for their post-diploma degree year at the PE campus (the 4th year was not compulsory and was not presented at the G campus) had had difficulty mixing with PE students in the past, preferring to form their own ex-G groups. This time, however, G students were welcomed by ex-team members at PE and immediately accepted into the PE student group (CS2G2-9).
Loyalty

Interestingly, 61% of the students agreed that they were more inclined to work and not let their team down in a virtual than in a co-located team. This supports findings in the literature and was surprising as it was assumed that without knowing their team members the opposite would be true (see sections 3.5.6 and 4.7). Students’ comments included: “If you work in a group and with deadlines, you want to do your best” (CS2G12-60); “because you have people depending on you that you have never met, you somehow feel responsible for them, and that’s when you perform at your best” (CS2G5-25); and “I realized how important it is to work according to a schedule and not to disappoint one another” (CS2PE9-41). Similar sentiments were expressed by CS2PE1-2, CS2PE8-37 and CS2PE3-12.

6.8 Facilitation

Facilitators

Although the PE lecturer was the same as in the first additional cycle, I no longer taught the module at G. This was taken over by a part-time lecturer with several years of industry experience, including some participation in industry virtual teams.

The Computer Services personnel at PE agreed to help with the NetMeeting session in the absence of the PE lecturer, which again was done on a goodwill basis. Unfortunately, they were prevented from helping the students owing to circumstances beyond their control.

I coordinated the DCLA on both campuses with the help of the two lecturers. Although the PE lecturer was not on campus during most of the assignment, she still had to execute the initial planning (organising the Computer Support, computer laboratories, assignment introduction lecture, initial student preparation and motivation) and post finalisation (conducting test, peer assessment and questionnaire) of the DCLA at PE. At least in this cycle the DCLA added value to the PE lecturer in that her students were kept busy with constructive work during
her absence. The part-time lecturer at G co-facilitated during the lecture periods. Although asked to confirm whether my marking was fair, neither lecturer had the time to help me with the assessment.

Level of facilitation

The PE lecturer and I organised the environment for the DCLAs before I initiated the DCLA at both campuses face-to-face. During the assignment the part-time lecturer and I helped with the two NetMeeting sessions at G. The students could contact me with problems by email and I helped the G students face-to-face. Unfortunately, no debriefing session could be held at the PE campus. A comprehensive feedback document was set up and emailed to students instead.

In the first additional cycle a student requested tighter lecturer control on the assignment. Unfortunately, in order for the DCLAs to be viable in our environment they had to be executable with minimal additional lecturer time. Therefore, communications were again not monitored. CS2G6-29 and CS2G7-34 requested that lecturers monitor the communications for non-participation, not wanting to handle the non-participators themselves.

The absence of the PE lecturer was not seen as a major problem by the students. Only CS2PE10-45 mentioned it in the post-mortem reflection, and only 28% of the students stated that it impacted on the success of the project. Contrary to all expectations, practically all the students participated. This showed that when participants are motivated, less control is needed (contrary to the findings in the literature – see section 3.5.9).

A few PE students emailed me directly with queries. A more general approach was that the problems were resolved in the teams and if some issues required further clarification, the G students in the team communicated with me face-to-face and reported back to their teams. There was no evidence of a lack of trust between the students and me on either campus, and it can be assumed that meeting the students at the PE campus during the initial lecture and handling the assignment
fairly in the first additional cycle contributed to building trust, although there is no evidence for this and it was not researched.

Workload

My time investment for this cycle was still high. Although I used the previous documentation it had to be extended and an example and assessment rubrics added. This could have been reused, had it not been that the DCLA had to be moved to another course module due to course structure and lecturer changes.

The recurring costs were higher than hoped for. These covered negotiations with the PE and G lecturers to plan and execute the assignment; getting the class lists and setting up the teams and topics; organising the environment at PE (PE lecturer) and G (Computer Support staff for the NetMeeting sessions, overlapping timetables); driving to PE to initiate the assignment (eight hours on the road plus costs for car hire and petrol); initiating the assignment at G and attending lectures; additional face-to-face facilitation of G students; facilitating the PE students via email; sending reminders for due dates; collecting and acknowledging receipt of deliverables; setting, organising and conducting the test; assessment; calculating the peer assessments; setting up and emailing students and lecturers the feedback on team and individual performances; and motivating marks when queried. To encourage the PE and G lecturers to allow the assignments to be executed in their e-commerce module, their additional workload had to be kept to a minimum. This meant that I had to carry most of the recurring costs, but this was not sustainable after the termination of my research interest in the DCLAs.

Students suggested that an additional intermediate deliverable is added consisting of only the value chain to ensure that the links are correct before proceeding to the individual links (CS2PE4-17, CS2G4-19, CS2PE8-35). Unfortunately, each additional deliverable increases lecturer time requirements (see section 3.5.7).
**DCLA sustainability**

The lecturers and students agreed on the value of the DCLA for the IT students, but for it to be sustainable it needed a dedicated coordinator with virtual teaming knowledge who would be prepared to invest the extra time. Neither e-commerce lecturer was prepared to continue with the DCLA without my coordination, as their participation was mostly based on goodwill towards me. The faculty management was still not involved and the DCLAs not high enough on the teaching priority list to make them viable without my involvement.

**Virtual team training**

The only virtual teaming training the students received was the initial briefing/training lecture and the assignment documents in which the most important virtual teaming aspects were covered. Thirty-five percent of the students felt that the initial lecture had not prepared them adequately for the assignment and only 23% felt that it had.

**6.9 Assessment**

It is difficult for the students at the remote campus to determine the standards expected for the task. Assessment rubrics giving an indication of what was deemed important were drawn up for the team’s value chain, the individual links, the team leader and webmaster, and the post-mortem reflections. These rubrics were seen as helpful by 65% of the students. However, it was disconcerting to discover that only 65% of the students felt that the rubrics covered all the important assessment points, regardless of the fact that they were given the opportunity to suggest changes, but no suggestions were received.

The assessment results were summarised by team with the help of the rubrics. Feedback on aspects not covered in the rubrics were added and emailed to each team member. A further four-page general feedback document was emailed to all students and lecturers.
To determine how much knowledge the students had gained, this cycle included a 30-minute test covering application-type questions on the industry value chain (27%) and virtual teaming (73%) (copy of test included in Addendum D). Queries from the PE campus students regarding low marks were justified via email to the PE lecturer.

**Mark weight**

The mark weighting was the same as in the first additional cycle, namely, 10% of 40% of the module’s final mark. This was still low for the amount of work expected of the students, but could not be changed. With practically all students participating, it did not have the same negative impact on participation as in the first additional cycle, where it was listed as one of the reasons for non-participation.

**Mark distribution**

To move the emphasis from the carrier task, the weighting for the carrier task (value chains web site) was reduced to 57% (25% individual, 25% combined and 7% test question) and the weighting for virtual team learning increased to 43% (25% post-mortem reflection and 18% for the test). Built into the 57% for the carrier task was a need to team virtually to be able to derive the combined deliverables.

A substantial portion, 75%, of the final mark was assigned to individual work. The individual link and the post-mortem reflection were dependent on students’ participation in the teams; however, students were able to get high marks for the test by merely studying the assignment documents and using some imagination. Finding a balance between individual and group accountability was difficult; a high individual mark has the advantage that it lessens the students’ feeling of stress and uncertainty when not in control of their own marks (ethical issues), but lowers the need to contribute to the success of the group.
Plagiarism and erroneous individual links impacted negatively on the students' final marks. The PE lecturer, therefore, did not include the individual link's mark in the final calculation, but let the other three marks (group mark, post-mortem feedback, and test) carry an equal weighting of 33.3% each. At G the marks were taken as originally calculated.

Together with the test, the number of deliverables had increased to four. This meant that each deliverable now counted two-and-a-half marks towards the semester mark and only one mark towards the final module mark. This is a very low reward for the amount of effort expected from the students and from me as the coordinator, facilitator and assessor.

**Peer assessment**

As in the first additional cycle, the peer ratings were not a fair reflection of student participation. In this cycle each student had to rate each fellow member on 17 questions according to a 4-point Likert scale (excellent, good, less than satisfactory, not satisfactory). This was converted into a peer mark for each member. Generally, team leaders received the highest rating because they had been the most “visible” to members. The other members were given very similar ratings with a bias towards own campus members (also experienced in the literature, see section 3.5.8). In one team the members had colluded to give each other good marks, defeating the object of the peer rating. Only when a member was not committed at all (low marks for all the individual deliverables) did s/he receive a correspondingly low mark from his/her team members (only one exception).

**6.10 Participation**

Participation was surprisingly high with one PE student not participating. Only seven of the 59 participating students did not hand in their post-mortem reflections, and only one did not write the test. Positive comments by the students about the
commitment of team members included: worked hard; pulled their weight; were well organised; cooperated well; did not need constant monitoring; and met deadlines. Furthermore, teams displayed good team spirit and members enjoyed working together; felt that the team was great and had done a “really good job”; and were satisfied with the accomplishments (mentioned in fourteen PE and five G post-mortem reflections from students from nine of the twelve teams). Sixty-eight percent of the students said that they would not mind doing a project with the same team members again.

Many students were committed, but it was disconcerting to discover that 29 of the 59 students handed in an incorrect individual link even though they had been given an example in the assignment document and several of these had plagiarised their work which is considered a serious offence at the university. Of these 29 students, 13 passed the e-commerce module, so they could not have been uncommitted to their studies in general. An additional concern was that although eight of the twelve industry value chains were well done, nine of the 34 members in these eight teams could not create a value chain in the test. Although practically all students participated, all the students did not have the same high commitment level. Concerns about this were expressed by the leaders of teams 9, 10 and 12, as well as some of the students (CS2G3-15, CS2PE4-16, CS2PE4-18, CS2G6-30, CS2G11-54, CS2PE12-55). To quote team leader CS2PE9-40: “… they not taking any initiative and or (sic) interest in terms of understanding what was needed to be done for the project”. Whether this was peculiar to the DCLA or a general attitude among students was not researched further.

The test was added to determine the level of knowledge constructed. The average score was relatively low (52%). Twenty-four of the 58 students failed the test (mark below 50%) and only nine received a mark above 70%. The questions on the industry value chain were answered satisfactorily but not the questions on virtual teaming. Students were required to debate virtual teaming issues rather than regurgitate learnt information. However, in the e-commerce module, it is my
experience that IT students have difficulty answering discussion-type questions, so the low marks may have partially been due to this. There was no significant correlation between the individual link and the test results nor between the post-mortem reflection and test results.

The quality of the post-mortem reflections varied and was on average lower than in the first additional cycle. Students had less reason to complain and, therefore less reason to reflect properly on their experience. Eighteen students received over 80%, and 17 below 50%, with the average mark being 57%. The students, again, were surprisingly honest with positive and negative feedback that generally corresponded within teams.

To determine whether the students who had not handed in all the deliverables were also overall low performers, the results of the DCLA were compared to the final results for the e-commerce module. Most of the students who failed the course module had also failed one or more of the DCLA deliverables. On the other hand, some students who had failed all individual deliverables did well in the course module, indicating that their low performance on the DCLA was not because of inability or an overall low commitment to their studies. This was not researched further.

The differences in participation rates at the G and PE campuses in the pre-research and the first additional cycle, and the high levels of participation at both campuses in this cycle raised questions about the reasons why students participated in the DCLAs. Several reasons for non-participation given in the pre-research and the first additional cycle were still present, for example, low mark weighting of the DCLA; the workload of other course modules; no initial face-to-face meeting; limited communication tools; biased peer assessments that could not be used; and no monitoring of communications by the lecturers. Over and above these, in this cycle there had been little on-campus facilitation at PE. This cycle also did not comply with any of the methods employed in the literature to
encourage student participation, namely, high facilitator involvement; high mark weighting; lecturers monitoring communication; or giving the best team a prize (see section 3.5.9).

In an open-ended question the students were asked for their reasons for participating. Only nine out of 43 students (who returned the questionnaires) specified marks as their main reason. Other reasons given included the excitement of a new experience; the learning value of the experience; intrigued by the possibility of doing an assignment virtually; working with strangers on a assignment; hard-working and enthusiastic team members; not wanting to let the team down; experience of being a group leader; a challenge; fun; personal goals and work ethics; meet new people in class; and required for the module. This was a surprising finding contrary to previous beliefs in the literature (see section 3.5.9)

6.11 Student perceptions of the DCLA

In the questionnaire the students labelled this DCLA as successful (79%), enjoyable (67%), worthwhile (65%), and an efficient way to learn about virtual teams (79%) and value chains (74%). Sixty percent agreed that the assignment had given them experience in communicating effectively and sharing information in a virtual team. Comments in the post-mortem reflections included: a success (CS2PE1-2, CS2PE6-27, CS2PE11-5, CS2G12-59); positive experience (CS2G6-29); good/great idea (CS2PE2-8, CS2PE8-36, CS2PE10-43); good exercise (CS2PE12-55); satisfactory (CS2PE1-3); good initiative that should continue (CS2PE4-17); interesting (CS2G3-14, CS2PE10-45); and a 7 to 8 on a 10-point scale (CS2PE9-40).

The aspects influencing the students’ positive attitude towards the assignment were interesting:

- The task: represented a real-world problem and was worthwhile (CS2PE2-7, CS2PE4-18, CS2PE5-23, CS2PE6-37, CS2PE9-41), enjoyable
(CS2PE6-28, CS2G6-30), task split allowed for completion without serious problems (CS2G2-9), large individual section (CS2G4-20).

- Team members: hard working (CS2G6-30, CS2G8-38, CS2PE11-52, CS2PE12-57).

- Knowledge acquisition rewards: virtual team and communication tools (CS2G1-4, CS2G1-5, CS2PE2-6, CS2PE2-7, CS2PE2-8, CS2PE4-17, CS2PE4-18, CS2PE7-31, CS2PE7-33, CS2G8-38, CS2PE9-40, CS2PE9-41), time management (CS2PE9-40, CS2PE10-43), industry lessons (CS2PE4-16, CS2PE9-40), value chain and website (CS2G6-30), how to structure a project (CS2PE4-18), learned lessons valuable for the third year project (CS2PE7-31).

- Other rewards: meeting new class mates and students on another campus (CS2PE2-7, CS2PE8-36, CS2PE10-45), and inspiring to meet talented people who are hard workers (CS2PE8-37).

The students’ answers to the open-ended question in the questionnaire regarding the factors they thought contributed to the success of the DCLA covered the following:

- Teamwork where all members interacted, responded in a timely fashion, carried out their share of the work, completed work on time, had a good understanding between group members, and asked and supplied feedback.

- A positive attitude where all members were enthusiastic and motivated, willing to participate and get the work done quickly and professionally, did not slack off, were committed and did not want to let the team down, and were open with each other.

- Class time available to work on the assignment and good time management by the members.

- Good and regular communication and the communication tools.
• Good team leader who kept contact and organised the task (assigned work and informed of deadlines).

• Novelty of the task.

Eight of the students referred to negative aspects of the DCLA: time consuming (CS2PE2-8); more testing than anticipated (CS2PE1-3); the boring topics caused some students to lose interest (CS2PE4-16, CS2G6-30); a waste of valuable study time as nothing extra was learnt (CS2G1-4, CS2G7-34); and a bad experience (CS2G3-14, CS2G11-53). Interestingly, five of these eight students “agreed to a large extent” and one “agreed 50%” in the questionnaire that the DCLA was a success (2 did not fill in the questionnaire).

In the questionnaire, five students felt that the DCLA was not a success. They were from four different teams, and their other team members had on average rated the assignment as successful. The factors the students thought contributed to the failure of the DCLA were poor team interaction, difficult assignment, difficulty teaming with strangers, and tardy workers (open-ended question in questionnaire).

6.12 Reflection

The statement by student CS2PE7-3, namely, “[t]his year in my opinion seems to have found the balance very well” summarises the experience of the cycle described in this chapter. The success of this DCLA, as perceived by the students, was a careful balancing act between the different factors affecting the assignment, as several factors were still less than ideal.

Not all the aspects that were given as reasons for non-participation or areas for improvement in the first additional cycle could be addressed (see sections 5.11 and 6.10) and most of these were also identified in the literature as problem areas (see Chapter 3). The factors that could not be improved included unequal student populations at the two campuses; low mark weighting; demands on student time by other course modules; limited communication tools; the need for an initial face-
to-face meeting; maturity and disparate quality aims of the students (generally, third years were more motivated to make a success of their studies than first years, but were less mature than master's level students); and an even lower facilitation level with the absence of the PE lecturer. It was, therefore, a surprise that the cumulative negative effect of these factors was overshadowed to such an extent by the positive improvements that the students overwhelmingly labelled this assignment as successful.

Improvements that were implemented included a personal briefing/training session on both campuses; a reduced time frame allowing students to stay focused on the DCLA; overlapping timetables allowing for more NetMeeting sessions; less uncertainty regarding the value of the assignment and the time required from the students; past students from the first additional cycle conveying a more positive view of the assignments than past students from the pre-research; the presence of only one facilitator eliminated the possibility of conflicting advice (this was accidental as under normal circumstances the PE lecturer would have been on campus).

Some improvements benefited the students, but negatively affected the facilitator(s). More individual deliverables increased the students’ control over their own marks, but increased the facilitator workload in terms of assessment and reduced the weighting of each deliverable even more in the final module mark. By personally introducing the assignment at both campuses I could highlight the aim and value of the DCLA, include some virtual team training, emphasise the important aspects and pitfalls, and reduce unfamiliarity between me and the PE students. However, the costs of this included an eight-hour drive, car hire and petrol. The assignment was also unsustainable as I moved on to teach other courses and the lecturers for the e-commerce module did not have the virtual teaming knowledge or interest to continue. An extended peer assessment form asking students several specific questions regarding fellow members’ participation and commitment had no benefit, but increased the assessor’s time requirements.
Other improvements made it easier for the students to derive the deliverables giving them the impression that the assignment was a success. On the other hand, they reduced the amount of virtual teaming needed, thereby reducing virtual teaming learning, which was the aim of the DCLA. The combined effect of the extended assignment document, more specific assignment topics, and the example reduced uncertainty but also reduced the need for teaming and communication. The possibility of splitting the task early on, members not being responsible for other members' individual links and a high mark weighting for individual deliverables gave members more control over their marks, but further reduced teaming and communication needs. The need for teaming was dealt a final blow in many teams by team leaders who became the communication hub, eliminating the need for team members to communicate with each other. These factors led to students complaining that the assignment was more individual than collaborative (see section 6.7).

The question can be asked whether the first additional cycle, with all its problems, was more successful in teaching students virtual teaming skills than the second additional cycle. As virtual team learning is about the process and not the deliverables, it would be interesting to investigate whether a smoothly run, detailed assignment reduces knowledge construction and whether some pre-planned problems could increase the learning value. This requires balance and would need to be applied with care if it were to be sustainable. This was not researched further, but would make an interesting future research study.

Course changes and low student numbers at the G campus prohibited the continuation of the DCLAs in the same form. Although the facilitator workload was streamlined, there were still substantial recurring costs, especially if the DCLA had to be moved to another module. A colleague at my own campus requested that we used the knowledge I had gained from the DCLAs to implement co-located multidisciplinary teams. This research is briefly discussed in Chapter 8.
Evidence that the DCLA exercise had some long-term positive impact surfaced a few years later. Being aware of the pitfalls of virtual teaming, student CS2G8-38 made a career decision not to become involved in a virtual team when given the choice. Student CS2G2-9, who was then busy with his masters at the PE campus, expressed the disappointment of the PE students that the DCLAs had not continued as they had felt that it had been the highlight of an otherwise rather mundane third year.

6.13 Conclusion

In this chapter the second additional DCLA cycle carried out in 2004 at the PETech was analysed and the insights gained on the factors affecting DCLAs were discussed in terms of the aim, environmental influences, the task, the students participating, distributed communication, teaming aspects, facilitation, assessment, participation, and student perception of the DCLA. This cycle followed the four 1997 to 2000 pre-research cycles and first additional cycle executed in 2003. Several of the problems experienced in the first additional cycle were addressed, although not all problems could be corrected. Contrary to expectations the participation and student satisfaction in the second additional DCLA cycle was exceptionally high. Although several aspects were still less than perfect, their combined negative effect were outweighed by the effect of the positive aspects to make the overall DCLA execution a success in the eyes of the students. Unfortunately, the DCLA was streamlined to the point where students managed to attain the deliverables, but at the cost of a reduced need for virtual teaming.

One of the surprising aspects uncovered during the execution of the different DCLAs was the reasons why students participated. In the four cycles of the pre-research and in the first additional cycle, the G campus students had a positive attitude towards the DCLAs resulting in a high participation rate. This was contrary to the attitude on the other campuses and the relative low participation rates. The
second additional DCLA cycle was different. Most of the students from both campuses showed a positive attitude towards the DCLA and the participation rate was exceptionally high. The reasons the students gave for participating did not correspond with the reasons given in the literature, nor the ones the lecturers had identified.

Owing to the importance of participation in the action learning DCLA environment, this aspect was explored further in this research study. To gain a better understanding of the factors affecting participation in DCLAs and their interrelationships, the data gathered during the six DCLA cycles, as well as from the literature, were used for a GGT analysis exploring participation. The perceived cost and reward theory for participation that emerged from the data is given in the next chapter (Chapter 7).
Chapter 7

Perceived Cost and Reward Theory

7.1 Introduction

Participation concerns expressed by students and lecturers emerged from the data collected in the DCLA cycles discussed in Chapters 3, 4, 5, and 6. For example, refusal by lecturers to carry on participating was the cause of the termination of the pre-research cycles (see section 4.8) and the DCLAs being notorious for having low student participation rates although participation is important in the action learning environment (see discussions in sections 3.5.9, 4.10, 5.10, 6.10, 6.11 & 6.12).

Some interesting participation patterns were observed during the pre-research and the two additional cycles (referred to as cycle 1 and cycle 2 in this chapter). Firstly, survey data collected after cycle 2 showed that mark weighting played only a small role in the decision of students to participate. Students were more inclined to participate because of the excitement of a new experience, learning value, challenge, not wanting to let the team down, motivated team members, fun, personal goals, work ethics, meeting new people, and it being a requirement for the course (see sections 6.11 and 6.12). Secondly, in any DCLA cycle (except cycle 2) student participation varied. Some students did not participate at all, some participated until the end, and some stopped participating during the assignment. This changed in cycle 2 when the participation rate was extremely high, although several of the factors that were blamed for non-participation in cycle 1 were still present (see sections 4.10, 5.10, 6.10, 6.11 and 6.12). Thirdly, in the pre-research and cycle 1 students on one campus were keen to participate whereas students on the other campus(es) were not, despite the fact that the task was the same and the environments were relatively similar (see sections 4.10 and 5.10). In reality the
decision to participate was complex, based on numerous interrelated factors, and differed from participant to participant and within one participant over time.

By applying the GGT method to the data collected during the pre-research, the two additional cycles and the literature, a perceived costs and rewards (PCR) theory for participation emerged. The PCR theory is grounded in the data, but is elevated to a conceptual level which is no longer bound by time, place and people. It can be used to explain, understand, interpret and predict participation actions in the complex research area of DCLAs. The GGT and the way the theory was applied to the data are discussed in Chapter 2.

The presentation of the PCR theory in this chapter follows the recommendations made by Glaser (1992:77), namely, “[t]he story line is just the core category which accounts for most of the variation in the patterns the participants call a problem … It processes continually this problem”. The storyline in this chapter is integrated around the core concern of how participants continually resolve costs and rewards in their quest to decide whether to participate/carry on participating.

To include references to the data (indicators) from which the theory was developed has been proven to dilute the theory. Owing to the elevation of the theory to a conceptual level, several indicators in the data can be used to give evidence for the same concept, property and/or relationship. Glaser (1998:199) warns that “[t]oo many illustrations can severely dilute the theory”. He further maintains that “[i]n academic writing I always favour more concepts at the expense of illustrations, since space is limited and concepts carry the overall theory and have in vivo imagery which virtually illustrates them in any case”. For the completeness of this thesis, examples of the indicators as well as the references, apart from a few which were used to illuminate the theory, were moved to Addendum E.

In this chapter the PCR theory is presented, followed by the application of the PCR theory to DCLAs to interpret, explain, understand, and predict participation in DCLAs. All the parties who have an interest in the execution of a specific task will
be referred to as stakeholders, rather than participants. When references are made to the experiences in the DCLAs it refers to the discussions in sections 3.5.9 (literature), 4.10 (pre-research), 5.10 (cycle 1), and 6.10, 6.11 and 6.12 (cycle 2), unless otherwise specified.

7.2 Perceived costs and rewards (PCR) theory

The perceived costs and rewards theory is presented in terms of the calculation of perceived costs and rewards, task-related costs and rewards, individual related cost and rewards, the value of time, the impact of uncertainty, expectations and fairness, and the impact of the other team stakeholders.

7.2.1 Calculation of perceived costs and rewards

Whenever a stakeholder is interested in participating or reconsiders continued participation in some task or activity with other stakeholders, a PCR calculation is made. This calculation is comprised of four different concepts, namely, perceived, costs, rewards, and the margin between the individual’s total perceived costs and total perceived rewards.

Participation in a task carries a cost for a stakeholder. The costs may be tangible and/or measurable (e.g. time, monetary), or intangible and/or unmeasurable (e.g. frustration, feelings of not being needed or valued). Similarly, participation carries a reward. Rewards may also be tangible and/or measurable (e.g. marks, monetary), or intangible and/or unmeasurable (e.g. enjoyment, self-actualisation).

Each individual stakeholder has his/her own unique personal perception of the value of a specific cost or reward factor to him/her. These values differ from stakeholder to stakeholder and are not static, but can change over time. For example, obtaining a good mark for an assignment has greater perceived value for a student to whom this mark could mean passing or failing the course module than to a student who would pass comfortably even without obtaining marks for the assignment. The perceived value of a good assignment mark can change during
the assignment if a student fails a test and realises that s/he now needs a good assignment mark to pass.

To make a decision on whether to participate or not requires a perceived cost versus rewards calculation. If the margin between the perceived total rewards and the perceived total costs is relatively large, whether positive (rewards more than costs), or negative (costs more than rewards), the decision to participate or not is easy. The smaller the margin, the more difficult it becomes to decide, as the PCR are not exact and the probability of making a wrong decision increases as the margin decreases.

Properties of PCR

The PCR factors and their values have general properties which contribute to the difficulty of calculating the PCR margin:

- The factors are numerous.
- The factors are interlinked in a complex network of relationships (e.g. a greater reward in terms of marks might imply that more time costs need to be spent on an assignment).
- Usually the factors are not well defined, can be unknown at the time and/or are not consciously identified by a stakeholder at the beginning, during, or even at the end of the task (e.g. some unexpected rewards only become apparent some time after the task has been completed, such as the value of a friendship that was built during a task).
- The role of each of the PCR factors in the calculation is highly individual to each stakeholder and can change over time (e.g. some students attach a high value to building relationships, others feel it is a waste of time; this could change when students become aware of the possible rewards of the relationships).
• The perceived cost or reward value attached to each factor is highly individual to each stakeholder and can change over time (e.g. the value attached to time is dependent on the other demands on a student’s time; it changes when a test draws near that has a higher weighting in terms of marks than the task).

• Most of the PCR values are not measured in calculable units (e.g. enjoyment).

• The PCR values are not convertible to one common numerical unit that can be added or subtracted to form the margin (e.g. the value attached to building friendships and that to marks cannot be added or subtracted unless the stakeholder rates each of them on, for example, a Likert-type scale, or attaches a monetary value to them).

• The PCR factors and their values are uncertain and have to be estimated, often on the basis of partial or incomplete information (e.g. the amount of time that each student had to spend on the assignment was uncertain as distance communication with unknown team members is unpredictable).

• Each PCR factor can be affected by numerous other factors, several of which are beyond the control of the stakeholder (e.g. the stakeholder has little control over the skills and commitment level of fellow team members).

• Some factors may have a false prominence at the time of calculating the PCR, whereas others may have an unexpectedly large impact (e.g. the lecturers viewed marks as important, whereas in reality several other factors carried a higher importance for the students).

Strategies

Even though the calculation of the PCR and the margin is highly subjective and inaccurate, people constantly make decisions about participation in tasks and activities in their everyday lives. The crux lies in the width of the margin rather than
in the exact calculation of each PCR. If the PCR margin is large the inaccuracies inherent in the calculation are unimportant. If the PCR margin is small the decision becomes more prone to error.

If the stakes are low an erroneous decision does not carry a large penalty (e.g. when a student decides not to participate in the DCLA, but has enough marks still to pass the course module). A quick decision can be made based on partial knowledge of the task and sometimes on a “gut” feel which is sensitised by past experience. If the stakes are high, an erroneous decision can have far-reaching effects (e.g. when a student decides not to participate in the DCLA and fails the course module due to losing the marks).

Different strategies can be followed to improve the decision. Firstly, the stakeholder can investigate the costs and rewards factors for options to reduce the costs and/or increase the rewards (e.g. some students deciding to free-ride when all members in the teams get the same team mark). Secondly, depending on the time available, the stakeholder can list all the PCR and try and attach a more conscious value to each. This makes the factors more identifiable and real and the stakeholder can invest some preliminary costs to gain more knowledge of the higher valued factors. It adds to the total cost of the task and needs to be balanced by the size of the rewards of the task. Thirdly, the stakeholder can start participating in a type of “probation” period whilst gathering more information. A recalculation of the PCR margin is then carried out after a certain time period has elapsed, or after more information becomes available. This option carries a cost without the guarantee of receiving the rewards, unless some of the rewards are received during the probation period. Backup plans can be made, but these also carry a cost. A fourth solution is to change the PCR factors and values to increase the margin. However, this is only possible if the stakeholder has control over the factors to be changed. The costs can be increased with a concomitant larger increase in rewards (e.g. increasing the effort put into the assignment could result in a considerable increase in the marks received), or the costs can be reduced
with a concomitant smaller reduction in rewards (e.g. when a lecturer reduces the size of the assignment considerably for a smaller reduction in marks).

The PCR factors and values change over time, thereby necessitating the *recalculation* of the PCR to re-evaluate continued participation. This can be triggered by situations that cause a substantial change in PCR, such as changes in the environment; more information becoming available from participation in the task; an intermediate milestone that is reached; a cost that continues to grow unexpectedly beyond the original estimates; a reward that continues to diminish; or after a period of inertia the circumstances have changed. When recalculation indicates that the perceived total costs are now higher than the perceived total rewards, the stakeholder can attempt to change the PCR factors or values, or reconsider participation. A point of no return may be reached when the past investment becomes so high that the stakeholder cannot afford to stop and not receive the rewards. This is a dangerous situation as the costs can continue to escalate. Deciding to stop means that rewards are forfeited, but other tasks can be undertaken. This affects the other stakeholders, however, and could carry additional costs in terms of loss of trust, respect and goodwill from fellow team members.

Stakeholders base their PCR calculations on their own, often limited, past experiences, and on the experiences of others gleaned from discussions or written accounts. This information is often incomplete, irrelevant and/or inaccurate for a new task, especially if the task is substantially different to the previous tasks, the team members are new and/or the environment has changed. The organisers of a task should make a concerted effort to increase the stakeholders’/prospective stakeholders’ awareness of possible costs and rewards, as the total cost of losing a stakeholder before the task begins is often less for the remaining stakeholders than the costs of losing a stakeholder during a task. Students in cycle 1 wrongly expected that the DCLA would again be a failure as in the pre-research. Unfortunately, the importance of this for participation was not realised and the
wrong perceptions only corrected in the debriefing session after the completion of the cycle. In cycle 2 the students started with a better perception of the new DCLAs and were made aware of costs and rewards in the briefing session before the start of the assignment.

It is important that organisers are honest about rewards and costs, as the short-term reward for dishonesty is usually overshadowed by the long-term costs. This point was clearly demonstrated in cycle 2: in the briefing session before the start of the assignment I informed the students of the main costs and rewards they could expect and also advised them to inform each other of the marks they were aiming for and their level of commitment to the task. Instead of reducing participation, the participation in this DCLA was extremely high. Students are not always aware of all the costs and rewards of an assignment and may feel cheated when they discover the costs are higher than expected, or a fellow student is not prepared to be as highly committed to a task as s/he expected him/her to be.

7.2.2 Why are we doing this? Task-related PCR

The task is only viable if it carries a positive PCR ratio for all the stakeholders needed to complete the task. Although each stakeholder views the PCR attached to a task differently, certain properties of a task impact on the PCR calculations of all the stakeholders.

Typical task-induced costs include time (can be used to receive other rewards), effort, stress, fear, frustration, insecurity, boredom, dissatisfaction, and intensifying feelings of inferiority. Typical rewards include monetary, marks, acquiring knowledge and skills, growth opportunities, excitement, enjoyment, opportunity to contribute and feel needed, pride and satisfaction with a good result, task adds value to the wellbeing of others, feelings of accomplishment, opportunity for self-actualisation, opportunities to build goodwill, and the building of new relationships and friendships.
Some characteristics of a task make it easier for stakeholders to determine and estimate task-related PCR reasonably accurately. These characteristics include a task that is simple, straightforward and structured; can be broken easily into subtasks; a substantial amount of information is available about the task and its execution; cost and reward information is available; similar tasks/subtasks have been executed before and cost and reward information is available; the environment is conducive to executing the task; the rewards are reachable; the rewards are guaranteed; and stakeholders with the skill needed for the task are available. The opposite characteristics make costs and rewards difficult to determine and inaccurate. Unexpected hidden costs can surface during the execution of a task adding to the costs and not adding to the rewards. Sometimes the task is so difficult, the time, scope and costs are so misaligned, or the environment is so disorganised that some of the rewards might not be attainable (typical scenario experienced in many IT projects – Standish reports 1995; 1999; 2001).

7.2.3 Living with self – individual-related PCR

Each stakeholders’ unique “self” develops from a combination of aspects including genetics, past experiences, maturity and environmental circumstances. The “self” adds a set of unique PCR factors, mostly intangible, to the PCR calculation of each stakeholder. Typical “self” factors include personality, attitude, interests, preferences, tolerance levels, insecurities, general fears, general abilities, work ethics, approaches to work, time management skills, commitment level, motivation, knowledge, strengths, weaknesses, task skills, life skills, emotional intelligence, background, frame of reference, experiences, aims, goals, aspirations, teaming skills, communication skills, and environmental circumstances, to name but a few. The “self” also exerts a unique influence on the costs and rewards of task-related factors and on the PCR of the other team members. A typical example of the influence of self on a student’s PCR and those of the team members in the DCLA
was the marks each individual student aimed for. Some were prepared to invest considerable time in creating a high quality deliverable to obtain a distinction, which caused conflict as other students in the team were satisfied with just passing and were not prepared to invest additional time in lifting the quality of the deliverable. The students aiming for higher marks would, at times, incur additional costs by redoing the weaker contributions of other students, motivating weaker students, or doing the work themselves for the weaker students.

Positive member characteristics in a teaming situation that can increase rewards and reduce costs for all participating members include being committed and having a positive attitude towards the task and the team; being motivated to do the task; being accountable to the team; having the skills and knowledge needed for the task and being honest about them (being over-skilled carries its own risks such as boredom); being skilled at working in a teaming environment; having good interpersonal and communication skills; being prepared to support other team members with task-related and social problems; being prepared to ask for help when needed; knowing who to inform about what and keeping these stakeholders informed at all times; being prepared to share information that is important to the team; being prepared to encourage and motivate other team members; at all times putting the interests of the team before own interests; being prepared to give honest praise where due; checking work performed by other team members and giving timely positive feedback; and not being prejudiced.

Stakeholders are often unaware of the influence of “self” on their PCR calculations. For example, a student lacking in assertiveness might become frustrated with the other students for not giving him/her an opportunity to contribute. In the meantime, the other students are as frustrated because they feel the student does not contribute his/her share to the team. This type of scenario usually results in greater costs and a lack of rewards, such as frustration, feelings of unfair treatment, inaccurate feedback that can exacerbate weaknesses, and loss of opportunities to acquire skills.
Owing to the uniqueness and subjectivity of the PCR to a stakeholder, it is impossible for another person to determine the exact PCR for a specific stakeholder. When a person feels that a stakeholder’s PCR calculation is grossly inaccurate, s/he can make the stakeholder aware of it using his/her own perception of the costs and rewards. The stakeholder can then recalculate PCR using the additional information. In the first additional DCLA cycle this was done in the debriefing session when the students were made aware of how much they had in actual fact learnt about virtual teaming.

One of the criticisms aimed at previous social theories based on costs and rewards for making decisions is the perceived lack of room for altruism (see section 8.5). This depends on what is included in the perceived rewards. Recent research has proven the age-old belief that to do good is to feel good. The research conducted by Schwartz, Meisenhelder, Ma and Reed (2003:778) showed that “[h]elping others is associated with higher levels of mental health” after researching the effect of altruism on 2,016 members of the Presbyterian Church throughout the United States. The research by Moll, Krueger, Zahn, Pardini, de Oliveira-Souza and Grafman (2006) shows that there might even be a biochemical explanation for the positive emotions associated with altruism. The brain’s mesolimbic system, which is the part of the brain that is activated in response to monetary rewards, sex and other positive stimuli, was also activated in subjects by a decision to contribute a part of their research payment to charitable organisations. When intangible feelings such as pleasure and happiness are included as rewards, altruistic actions play their rightful role in the PCR calculation. The perception of what constitutes a reward for an altruistic deed differs from person to person, however.

The previous three sections investigated PCR in general and task-related and individual-related PCR in particular. In the next five sections the impact of the value of time, uncertainty, expectations, fairness and other stakeholders on the
PCR of a specific stakeholder is investigated, as these were aspects that emerged as concerns for lecturers and students in the DCLA.

7.2.4 Time is money – the value of time

Time is a commodity. Time well spent carries a high perceived reward for the stakeholder. On the other hand, wasted time carries no reward, rather an extra cost in terms of frustration and loss of rewards when the time could have been spent on other tasks or activities. Voluntary time “wasted”, such as on a fun activity or whilst relaxing, is not seen as wasted time here, because it still carries a reward for the stakeholder, although maybe not an optimal reward. It may be argued here that it does not carry a reward in terms of the task.

Although time can be measured in hours and minutes, the value of the time spent on a task has a different unique intrinsic PCR value to the stakeholder. Time can only be spent once, therefore, the value depends on the rewards the stakeholder receives from the task compared to the rewards that can be received if the time is spent on another task/activity. This perceived value of time by a stakeholder changes over time as the other demands on the stakeholder’s time changes. For example, if students are given time to work on the DCLA in the class time assigned to the course module, they will perceive the cost as less than when they have to work on the task in after-class hours, especially if they also have to learn for a test that carries a higher weighting.

The time spent working on a task can be used in different ways: firstly, the stakeholder can procrastinate and waste time owing to a lack of focus and urgency, or the time can be used productively. This is influenced by the amount of time available. There is a tendency for work to expand so that it fills the time available, also known as Parkinson’s Law (Oxford Dictionary of Proverbs [online]), often with no increase in reward. Secondly, if the time frame for the work is long enough, the task can be divided into smaller sections and scheduled for less
valued time. However, this carries an extra cost in that the work has to be divided up and the threads of the assignment have to be picked up and refocused on.

How to balance the costs and rewards is highly dependent on the task and the “self”, as some stakeholders have good time management skills and others have a tendency to be last minute workers. It is difficult to determine a time frame that will minimise the costs and maximise the rewards for each stakeholder in a team. The way each stakeholder makes use of time impacts on the PCR of the other stakeholders in the team; for example, a tardy worker can cause another stakeholder, who, for example, needs to assemble the final deliverable, to work in highly valued time.

Ideally, time should be used to deliver maximum perceived rewards for all the stakeholders in the team. This is usually not possible, especially not all the time, as there are conflicting views on what constitutes good use of collaborative time (e.g. some stakeholders find it important to spend time building relationships, others feel it is more important to spend the time discussing aspects of the task).

Estimating the cost of time needed for a task is difficult because, as discussed above, it depends on many factors, not all of which are within the control of a specific stakeholder. Experience and knowledge of similar tasks, soliciting the help of experts, or breaking the task down into subtasks can improve estimates, but carry additional costs. The longer the time frame the more difficult it becomes to predict the alternative activities and tasks that compete for the same time as the task at hand.

7.2.5 Will it happen? The effect of uncertainty on the PCR

Each task carries an element of uncertainty in terms of the execution processes, the quality standards expected, the other stakeholders and the environment. Determining the effect of uncertainty on the PCR equation is difficult, as uncertainty is not static and fluctuates during the different phases of the task as some uncertainties are resolved and new ones surface; nor are all the
uncertainties necessarily known at any specific time during the execution of the task.

Uncertainties raise the perceived costs, as they increase the possibility that mistakes will be made; increase the costs of the task when they need additional clarification, holding up progress; and add individual-related costs, such as frustration and stress. Uncertainty can also manifest in whether the rewards are attainable and whether the rewards will be received.

A risk is taken whenever uncertainties exist and the stakeholder decides to follow a certain course of action based on incomplete information. When a decision is taken not to participate, the stakeholder risks forfeiting the rewards, but can pursue other tasks. If the stakeholder decides to participate the uncertainties can be given probabilities, resulting in more "calculated" risks being taken if the costs of a wrong decision will be high (similar to the suggestions made by Henderson and Hooper [2007], although they convert the rewards and costs to monetary values).

If uncertainties can result in high additional costs and/or reduced rewards, the stakeholders build in strategies to try and reduce the effect. These include adding task controls; laying down process rules; taking more control over the execution of the task (if possible); insisting that the task be broken down into subtasks with their own controls and rewards; getting to know and profiling fellow stakeholders; obtaining additional information about the task and/or stakeholders by talking to other people or by researching documents and/or the literature; making back-up plans; and/or reducing the level of participation until some of the uncertainties are resolved.

Each of these strategies carries a cost that needs to be added to the PCR calculation of the individual stakeholder. Therefore, a balance needs to be maintained between the worst costs that can result from the uncertainty together with the probability that the uncertainty will end in the worst costs, versus the cost of implementing strategies to reduce the uncertainty. For example, if there is
reason to believe that a specific student might not participate in the DCLA task, the
remaining team members can assign a probability value estimated from past
participation rates and commitment levels of the student. If the probability that this
student might not participate is high, the remaining team members may assign an
inferior task to the student and insist on quick feedback. They can then, with
relative ease and low costs, take over the task if there is any indication that the
student is not participating. The problem in a distributed environment is that the
knowledge of participation rates and commitment might not be available to
students on the other campus. The strategy followed by several students is then to
try and take control of the execution of the DCLA and/or to try to profile the other
students from the initial participation patterns.

7.2.6 You cannot be serious ... I expected it! The effect of expectations and
assumptions on the PCR

To expect or assume something carries a strong belief that it will happen, even
though it is still an uncertainty. This differs from an uncertainty in that the
stakeholder treats it more like a certainty than an uncertainty, usually taking little if
any precautions in case the expectation or assumption is wrong. Stakeholders
might not even be aware of all the expectations and assumptions made at any
given point in time, which may only become apparent when an expectation or
assumption is proved wrong. This can affect the stakeholder’s PCR at very short
notice and in different ways depending on the type of expectation or assumption
made.

Four types of scenario exist for the impact of expectations or assumptions on the
PCR. The first two scenarios are that the expectation or assumption is positive
(e.g. a fellow stakeholder is expected to complete his/her task on time, or the
rewards are expected to be received) and that this is (scenario 1), or is not
(scenario 2), realised. The other two scenarios are that the expectation is negative
(e.g. expecting/assuming that a fellow stakeholder will not finish the task on time,
or that some of the rewards will not be received) and that this is (scenario 3), or is not, (scenario 4) realised. With a positive expectation or assumption the stakeholder feels s/he does not need to incur the costs of the control measures or backup plans that would have been implemented had it been an uncertainty. If the expectation is realised, the stakeholder has reduced costs; if it is not realised, the cost of correcting it at the last minute could be much higher than if precautions had been taken, or otherwise rewards have to be forfeited. If the original expectation or assumption is negative, the stakeholder either incurs the costs of setting up contingency plans, or prepares for a reduction in rewards. This can affect his/her PCR margin to such an extent that the stakeholder decides not to participate. If the negative expectation/assumption is correct, the stakeholder has minimised his/her costs. If not, the stakeholder could have made an incorrect decision not to participate, or have incurred the extra costs for the contingency plans unnecessarily.

Hope is handled in a similar fashion to a positive expectation or assumption, although the stakeholder acknowledges that there is a higher level of uncertainty. Taking precautions could be impossible or the costs could be too high, necessitating the stakeholder to take a risk and “hope for the best”.

7.2.7 This is unfair! The effect of fairness on the PCR

Stakeholders perceive that they are treated unfairly if they are the victims of injustice, partiality, deception or inequity. This can occur when a specific stakeholder incurs costs but another stakeholder receives the rewards; a stakeholder’s PCR is affected negatively because of another stakeholder’s actions; another stakeholder receives the same rewards for a similar task at lower costs; another stakeholder receives higher rewards for a similar task at similar costs; or the stakeholder is deceived about the purpose and the costs are higher or the rewards lower than the stakeholder was led to believe or by the withholding of information.
People place a high premium on being treated fairly. A slight feeling of unfairness usually has little effect on the PCR, but when the intensity of the unfairness increases it can carry substantial additional costs in terms of lack of trust and loyalty (increases uncertainty and the need for precautionary measures), negative feelings and resentment.

A stakeholder who feels s/he is being treated unfairly can incur the costs of trying to convince the perceived defaulting party. This can result in the perceived unfairness being resolved or in one of the two parties surrendering unwillingly or terminating his/her participation. If the stakeholder does not contest the unfairness or one of the parties has to surrender, s/he can consider several courses of action. S/he can decide to ignore the unfairness and continue as before; grudgingly continue adding the costs of the unfairness to his/her PCR in future recalculations; covertly continue at a lower level to compensate for the extra perceived costs or lost rewards; rally support from other participants; or increase his/her rewards unlawfully to balance his/her own PCR calculation. Most of these options have a negative effect on the PCR calculations of all stakeholders. In the DCLAs, if the students in a team all receive the team mark, free-riding often occurs. While various tactics are used to try and resolve this, usually students grudgingly accept it, ultimately becoming negative towards such assignments.

If it is possible for some of the stakeholders to get rewards for free or for a low cost, the perceived value of the rewards may be significantly reduced. In addition, more and more of the stakeholders will try to receive the rewards for the lower costs, which can affect the total costs for the task and its quality. It also increases the costs for the remaining stakeholders who have to take over the workload, have to forfeit rewards, or have to share rewards with more stakeholders who have to be incorporated to complete the task.
CHAPTER 7  Perceived Cost and Reward Theory

7.2.8 You are fired! The affect of teaming and other stakeholders on the PCR

Participation in a task implies that there are several stakeholders who collaborate in the hope that the rewards for their combined efforts will be more than the sum of the rewards for their individual efforts (synergy) and/or the costs will be less.

The costs and rewards of collaboration

In teaming, each stakeholder’s personal PCR is influenced by the other stakeholders, as well as the cost and reward factors added by the needs of teaming. The more the stakeholders are dependent on each other, the more they tend to influence each other’s PCR. Typical additional costs are the need for communication and to manage the task, the stakeholders and the teaming. On the other hand, collaboration can reduce costs and/or increase rewards. It adds a wider collective set of expertise that can increase productivity if well coordinated; the workload is distributed and costs are shared, although this is offset by the finite rewards that also need to be shared but the collective rewards can be more due to the collaboration; more ideas (two heads are better than one); opportunities to brainstorm resulting in better processes or end-results; more types of task can be carried out; work can be cross checked and feedback provided; cross-fertilisation of knowledge and skills; shared enjoyment; shared excitement; and the possibility of building relationships, trust and goodwill that carry a reward even after the task has been completed.

Members need to be aware of and take into consideration the way their own individuality and conduct impacts on the PCR of team members. Addressing weaknesses can reduce overall costs and increase rewards. This can be accomplished through consultation and training, although these options carry their own costs, which need to be balanced by the rewards of the improvements. For optimal collaboration, team members need to be aware of and take into consideration the individuality and conduct of their other team members to reduce uncertainty and to reduce unattainable expectations and assumptions. In the
DCLAs, students requested initial face-to-face meetings to enable them to profile each other. Lacking this, several students admitted to profiling the other team members on the basis of their initial virtual communication patterns.

Membership

For an optimal PCR ratio for all stakeholders, their skills and individuality should complement each other and their collective skills cover all the skills needed for the task. It is important that the PCR margin for valuable participating team members is kept positive. If not, s/he might consider terminating participation or reducing participation levels. This would be costly for the remaining team members who will either have to reduce the rewards by reducing the task, find and orientate a new member (extra costs), or take on an extra workload (a trade-off because the extra costs would be offset by fewer people to share the finite rewards).

It is important that each member is able to contribute and feel needed, thereby being able to share in the additional rewards such as enjoyment, the satisfaction of being able to contribute something that has value, and self-actualisation. Knoll and Jarvenpaa (1995) found that the activities with the most consistent participation were those where the students felt they could contribute and add value. If some members do not contribute but share in the rewards, it not only affects the PCR of that stakeholder, but also creates feelings of unfairness and resentment in the remaining team members. Non-contributing members, even at times when members have to wait for other members to complete subtasks, are a cost (possibly also an added frustration) with no reward.

Cultural differences (national, organisational, functional) affect people’s assumptions, behaviours and expectations about work habits, team norms and leadership models. Stakeholders from similar cultures find it easier to form reliable expectations about the behaviour of fellow team members, thereby reducing costs owing to fewer misinterpretations, distortions, better interpretations and a reduced need for communication. On the other hand, carefully selected and well-managed
Interpersonal teaming factors that impact on stakeholders’ PCR

Trust is seen as the glue that holds the team together and it carries a reward that has value beyond the time frame of the task. It takes time to build trust, but it is fragile and can be shattered in moments. The higher the trust, the more prepared a stakeholder will be to allow the trusted person to impact on his/her own reward/cost ratio without control, believing that the trusted person will have his/her interests at heart. High trust is a double-edged sword, however, as it can result in costs saved (reduction in need for control, conflict, communication and contingency plans), but also in costly disappointments if the trust is broken. Swift trust was first defined by Jarvenpaa and Leidner (1999). This is a quickly built form of trust that is developed in the beginning to enable the task to proceed, but is only applied where absolutely necessary until time allows for deeper trust to be built or, if trust is not warranted, for more controls to be implemented.

When relationships are built it increases the feeling of inclusiveness or belonging to a team (a reward in its own right). This allows members to identify with the team and its goals, rather than see themselves as individuals each with their own goal. It also saves costs by, for example, enhancing effective teaming and task execution; increasing trust; reducing uncertainty; allowing for easier communication and decision making; encouraging mutual support; and decreasing the fear of exploitation. Relationships add to rewards through factors such as belonging, enjoyment and socialising opportunities, and friendships can be built that still have value after the termination of the task. Building relationships carries a cost, however, and not all stakeholders attach a positive value to it. This can lead to conflict where some members want to spend time on building relationships and others become frustrated by their efforts.
The greater the team’s cohesion, the more consistent the members are in thought and speech. On the one hand it saves costs (lessens the need for communication and the opportunities for conflict), but on the other hand, can reduce rewards through groupthink where a solution is accepted without considering other, possibly better, options. With high cohesion a decision by one team member that will positively affect his/her own PCR will, with high probability, also positively affect the PCR of the other members. The intensity of cohesion in a team can vary over time during the task.

Conflict can be positive or negative. Positive conflict allows for more ideas and knowledge building, resulting in additional rewards such as a better deliverable, satisfaction and enjoyment. Negative conflict is costly in terms of time, negative feelings and reduced team morale. If negative conflict is not identified and handled as soon as possible it can fester and explode with more intensity, or team members may decide to stop participating, carrying a high overall cost.

Goodwill building represents a deposit that can be drawn on at a later stage, even surpassing the task duration. Goodwill can be built up with and by all stakeholders and is determined by the conduct of a participant during the task. It carries a cost when built, but has rewards when needed. In commerce it defines a saleable asset.

Respect is gained through knowledge, skills, past performance, higher rank, personal ethics and general conduct. Other team members are more inclined to trust a respected person’s leadership/advice, allowing for the streamlining of task execution thereby reducing costs.

**Task teaming factors that impact on stakeholders’ PCR**

Ideally, all team members should share goals and visions, and be prepared to work for the common success of the team rather than for personal goals. When in place, these aspects improve productivity and reduce costs. When team members
have their own covert goals and aims they are more interested in improving their own PCR, even if it is at the cost of the PCR of the other team members.

Communication, verbal and non-verbal, is the backbone of collaboration. Effective and efficient communication reduces costs and can increase rewards, but requires skill. A stakeholder needs skills for sending a message (the right information, at the right time, to all the right people, to encode it accurately and appropriately, and transmit it across the best channel) and receiving a message (acknowledging, decoding, correctly understanding, and acting on it). Communication skills can be improved through training, the cost of which is offset by the reduction in costs of the improved communication. When online collaboration tools are needed, they carry a cost to purchase as well as for training to use them efficiently and effectively. Learning communication skills and how to use communication tools is an additional long-term reward that still has value after the termination of the task.

Sound project management techniques by a good project manager and/or team leader in terms of the Project Management Body of Knowledge PMBOK®, PMI, 2008) five project management process groups (initiating, planning, executing, controlling and monitoring, and closing) and nine knowledge areas (integration management, scope management, time management, cost management, quality management, human resource management, communication management, risk management, and procurement management) are important for minimising task-related and teaming-related costs and maximising rewards. Although employing a manager/leader carries additional costs, these will be small in comparison to the savings in terms of reductions in overall costs and/or increases in rewards.

External stakeholders

Other stakeholders outside the immediate task and team can affect the PCR calculation of team stakeholders. Their involvement could be minimal or extensive with varying degrees of impact on the team stakeholders’ PCR. Typical external stakeholders include the management of an organisation, family and friends. Often
all the rewards and costs are not known to a stakeholder, or the stakeholder is subconsciously biased in calculating the margin. External stakeholders (also trusted and respected fellow team members) can influence the participation decision by pointing out miscalculations or other costs and rewards allowing the stakeholder to recalculate the PCR margin.

### 7.3 Participation in the DCLAs

The PCR theory can be used to understand, explain, interpret and predict the participation patterns of lecturers and students in DCLAs. In this section, it is used to understand, explain and interpret the participation patterns experienced in the four pre-research and two additional DCLA cycles executed at the PETech during 1997 to 2004 (see sections 3.5.9, 4.10, 5.10, 6.10, 6.11 and 6.12). Further, guidelines are given for organisers of DCLAs with the help of the predictive power of the PCR theory.

**Lecturers**

The lecturers, apart from the researchers, had little to gain personally from participating in the DCLAs. Originally, in the pre-research, their main reasons for participating were that they all believed in the value of the learning experience for the students, the value it would add to the course, and goodwill towards the researcher and her supervisor. When the costs escalated due to exorbitant time requirements which included high valued time; large amounts of time being wasted owing to poor management; frustration; and student frustration which was aggravated by a high component of unfairness (no individual accountability); and little added value to the students because of low participation rates and low commitment, the costs exceeded the few rewards by far. Attempts by the lecturers to improve their negative PCR ratio were fruitless and were met with accusations rather than understanding. The magnitude of the cost escalation over the years was not understood by the faculty management, and finally, resentment started...
building which ended in conflict and resulted in the satellite campus lecturers withdrawing and the premature termination of the research.

In the two additional cycles one of the requirements was to minimise the additional costs for the participating lecturers, as this was the only way to get them to agree to participate. Although their costs were minimised, there were still recurring costs for them, such as lecturer communication to synchronise the assignments; class group facilitation; organising computer support; giving up lecture time; motivating students; finding non-participating students; and conducting the test and the survey. This was considerably more work than a similar co-located assignment would have been and I was acutely aware that their main reason for participating was their friendship and their goodwill towards me, although this was never openly mentioned out of courtesy. I am still extremely grateful to them for their participation and inputs.

Keeping the costs of the other lecturers low meant that I, as the researcher and organiser, had to bear the brunt of the costs. Although I had hoped that costs could be minimised by reusing documents created during previous cycles in the following cycles (only possible as long as the task and course module stayed the same), there were still greater than expected recurring costs. These included organising the environment (timetables, support, communication tools); managing the lecturer team; setting up the assignment (task and student teams); briefing and debriefing all the students on all the campuses (I was the only lecturer with enough virtual teaming knowledge); facilitating teams (this was done at a very low level to minimise costs); assessment; and feedback. As long as this was part of my research it was worthwhile to me, but as soon as my research stopped it was not sustainable. Although the costs were reduced, they were still too high and the rewards too low to warrant an extra investment by the IT faculty where the teaching time is limited and the IT area carries many other worthwhile experiences with lower implementation costs. This can be different for other faculties and
courses where the DCLAs carry a high reward for the course and students, such as online learning and communication courses.

Estimating the lecturers' costs for a new cycle of DCLA is difficult, especially if there are changes to the task, student population or environment. Once a lecturer has committed him/herself to a DCLA cycle it becomes very difficult to withdraw when the costs escalate, as this would affect the students and lecturers on all the campuses. This means there is a high degree of uncertainty for the lecturers.

Students

Student participation in the pre-research and additional research cycles showed some interesting patterns:

- Mark weightings played a small role in student participation (all cycles and in the literature).
- Different participation patterns existed within one DCLA (pre-research and first additional cycle).
- Although several of the main participation obstacles in cycle 1 could not be addressed in cycle 2, there was a high participation rate in cycle 2.
- Participation patterns varied from campus to campus (pre-research and cycle 1).

Assigning a mark weighting to a DCLA is difficult. If the mark weighting is low, there has to be additional rewards and the students need to be made aware of them. This is especially important if the assignments have just been introduced into a course module and students are unaware of all the possible rewards, or if the assignments have been a failure in the past and students base their decision to participate on their previous experiences or those of other students. This was seen in the pre-research and in cycle 1. The debriefing session held after cycle 1 showed the students how much they had learnt (see section 5.8), but came too late to encourage participation in that cycle. In cycle 2, students on all the
campuses were briefed on the costs and rewards before the assignment, which then resulted in a high participation rate regardless of the low mark weighting. A high mark weighting is problematic in that it can be seen as unethical as students’ marks are influenced by factors outside their control. In such cases the potential costs of the assignment in the course module are perceived by the student as high with high uncertainties, possibilities of unfairness and with uncertain rewards. Aversion towards the DCLA mounts, making the DCLA a generally negative experience.

Different participation patterns existed within each of the four pre-research cycles and cycle 1. Some students did not participate right from the start, some stopped during the assignment and some participated to the end. This implies that each student was affected by different task-related and individual-related factors, and each student attached different values to these factors. Most students in all cycles admitted to the value of the DCLA, but not the way it was executed. By addressing the cost and reward factors, the general PCR margin can be increased making it more worthwhile for more students to participate. This was achieved in cycle 2.

By analysing the data collected during cycle 1, several changes could be made to increase the general PCR margin. These included heightening the students’ awareness of costs and rewards in the briefing session (allowed for more realistic expectations and more informed PCR calculations); more NetMeeting sessions (changed task environment allowing for less time to discuss the task execution, and additional rewards in terms of learning to use a new tool); clearer task description (reduced uncertainty); one facilitator (reduced wasted time caused by misunderstandings and conflict, and reduced uncertainty); students meeting me during the briefing session (reduced uncertainty); higher individual component (increased fairness and less interdependency amongst team members); reduced time frame (increased focus reducing time needed to refocus, and reduced competition with other external tasks reducing the cost of time); making class time available (reduced the need for highly valued time); some virtual team training in
the briefing session (more realistic expectations of team members, better teaming and less wasted time on communications if rules were followed); teams were requested to appoint team leaders (allowed for less wasted time and better communication and task organisation); and generally a more successful execution of the DCLA (reduced frustration and increased fun and enjoyment). These collective improvements made participating in the DCLA more worthwhile for all the students, although not all the cost factors identified in the first additional cycle could be addressed. This confirms that the margin between the perceived costs and rewards is more relevant to ensure participation than the individual costs and rewards factors. The greater control and larger individual component did reduce the virtual teaming learning reward per student; however the students generally were not aware of the extent, lacking a frame of reference.

The different participation patterns on the different campuses were at first ascribed to the different cultures on the different campuses. The smaller satellite campuses, with their smaller student numbers, allowed for a closer relationship between lecturers and students, and between students, than the larger main campuses with their substantially greater student numbers. This perception was proven unfounded when, in cycle 2, there was no significant difference in participation rates, regardless of the fact that the students on the main campus had very little lecturer supervision during the assignment (see also sections 3.5.7, 4.8, 5.8, and 6.8). Exploring the reasons using the PCR theory, the following transpires. In the pre-research I had made my students aware of the additional rewards, and had told them to look for a learning experience in each problem, even if it was how not to do virtual teaming. I had, furthermore, promised them that I would not let the DCLA marks count against them as long as they participated. This decision was based on a “gut feel”, but in hindsight, removed one of the main obstacles in terms of the cost of participation – the unfairness and much of the uncertainty in an assignment over which they had very little control, but which could negatively affect their own marks. Instead of the teaming problems becoming a negative
factor, the students could now learn from them and see them as a challenge (reward). The need for highly valued time was not an issue in these assignments, as the students were allowed to work on the assignments in class time.

The negative experiences of the pre-research at the main campus were carried over to cycle 1. Whereas my students were looking forward to the assignment, most of the students on the main campus felt that it would be a continuation of the failure in the pre-research cycles and again not worthwhile participating in. The strategy of several of the students at the main campus in cycle 1 was to participate to a lesser extent and let the students at my campus do most of the work, thereby reducing their costs but still hoping to share in the rewards (one of the reasons why the students at the main campus did not volunteer to become team leaders). Unfortunately, the misunderstanding of the assignment’s requirements further confirmed this perception and for the students to try to resolve it would have increased the costs. As a result several of the students at the main campus, who had started to participate, stopped during the assignment. This perception was only turned around in the debriefing session (see sections 5.8 and 5.10).

Organiser guidelines

It is very difficult for organisers to estimate student participation in a DCLA as each DCLA is unique in aim, environment, task, students, communication methods, communication tools, teaming, facilitation, facilitators and assessment (see the literature discussion in Chapter 3 and the experiences in Chapters 4, 5 and 6). In addition, each student brings his/her own “self” to the assignment. By identifying as many factors as possible that will contribute to the individual lecturer and student PCR calculations, the size of the margin between the general costs and rewards can be estimated. If the margin is large and positive, the probability is high that most students’ and lecturers’ own PCR calculations will also have a positive margin, thereby increasing the participation rate. If the margin is small or negative, the successful execution of the DCLA will be in jeopardy and needs to be revisited.
to try and reduce the costs and/or increase the rewards. If the margin cannot be increased, the viability of the DCLA is called into question.

When compared to co-located collaborative learning, DCLAs carry a larger than normal need for time (often including highly valued time); elements of uncertainty (owing to a lack of knowledge of the team members and facilitators on the other campus); the possibility of unfulfilled expectations (owing to higher uncertainty and lack of knowledge); opportunities for unfairness (lack of visibility to counteract the unfairness or justify actions perceived to be unfair without observability); and are more difficult to team in (all students have to participate regardless of personality and ability; there is the difficulty of communication over a distance and a lack of visibility). This needs to be taken into account when DCLAs are planned. Because a corresponding high mark weighting reward carries its own high level of unfairness, the costs have to be reduced, or other rewards added.

The organisers have to decide on a task and an environment for the task, the aim of the learning experience, which lecturers and students will participate, the time frame and the time available within the time frame, the time required for the task, and the level of uncertainty needed for the task. It is important to note that the characteristics of the task influences the accuracy of the cost and reward estimates.

In addition to the task-related factors the organisers need to consider the “self”-related factors of the general student in the class group. All students have to participate and setting up groups with complementary personalities and skills could be impossible. Because the DCLA experience will usually be new to the students, training can be considered in life and teaming skills to prevent students from wasting their time and that of their team members, thereby incurring unnecessary costs.

By continually searching for uncertainties, organisers can identify and reduce/eliminate them where possible. This reduces costs and allows stakeholders
to make more accurate PCR calculations. It should be accepted, however, that unless the environment is extremely controlled, uncertainties will continue to exist and, therefore, processes have to be put into place to manage them, unless they form part of the learning experience. In this case the students need to be informed of the additional learning aim.

Through past experience (if this is not the first cycle) organisers can identify previously misplaced expectations and assumptions made by lecturers and students. New stakeholders can be given more information on what to expect from the task execution, and fellow stakeholders, thereby minimising false expectations that can carry a large cost if not realised. In addition, students can be given more information on fellow team members in terms of aspects relevant to the task (some of this could have ethical implications, however). By making the students aware of possible false expectations and assumptions, and by giving the students training on how to handle them, the unexpected costs of expectations and assumptions can be minimised.

Task organisers have to ensure that unfairness is eliminated completely from the tasks, otherwise their credibility and the value of the task will be affected. A bad reputation is difficult to correct. This can become a serious problem in educational DCLAs where individual accountability is difficult owing to the lack of visibility. In the educational environment, the students in the next DCLA cycle are quickly informed about the bad, and good, experiences with the task by the students in the previous cycle. This happened in the pre-research and the two additional cycles.

By giving attention to the possible PCR factors and the aspects affecting them, organisers of DCLAs can use the PCR theory to predict participation patterns. If the general PCR margin is large and positive, participation by most students is guaranteed. If the margin is small and positive, several students might decide not to participate, as their own PCR calculation could show a deficit. If the margin is
negative, most students will not participate and the DCLA will not be viable in its current form.

7.4 Conclusion

In this chapter a PCR theory for participation was presented. This theory emerged by applying the GGT method to the data collected in the four pre-research cycles, the two additional DCLA cycles and the literature on DCLAs. Firstly, the concepts “perceived”, “costs”, “rewards”, and “PCR margin” were explained and the properties of perceived costs and rewards investigated. This was followed by the different task-related and individual-related factors which form part of the individual’s PCR calculations. Then the other concerns of the stakeholders that affect the individual’s PCR were discussed, namely, the value of time, uncertainties, expectations and assumptions, the role of unfairness, and the role of the other stakeholders in the team. This chapter concludes with a description of the way PCR theory can be used to understand, explain, interpret and predict lecturer and student participation in DCLAs.

The power of the PCR theory is not limited to the area of DCLAs. In the next chapter (Chapter 8) the PCR theory is used to explain participation patterns in multidisciplinary collaborative learning assignments that were executed at the G campus of the PETech/NMMU after the DCLAs were discontinued. Chapter 8 also briefly discusses related social theories.
Chapter 8

Applications of the PCR Theory and Related Theories

8.1 Introduction

One of the properties of GGT is that “[i]ts generative nature always takes it beyond the substantive area being studied” (Glaser, 1978:6). This chapter shows how the perceived costs and rewards (PCR) theory presented in Chapter 7 can be applied to explain participation decisions in the substantive area of multidisciplinary co-located collaborative learning assignments. The assignment under consideration was one of several that were executed in a new research project at the PETech/NMMU after the DCLAs in the IT course were discontinued. This is not part of the research for this thesis but serves merely to show the transcendence of the PCR theory developed. In conclusion, a brief overview is given in section 8.3 of existing related theories, namely, economic cost and benefit analysis (CBA), rational choice decision-making theory, social exchange theory, and Nye’s social choice theory.

8.2 Multidisciplinary co-located assignment (MDCA)

The PCR theory is used in this example to explain why most of the students in a multidisciplinary co-located collaborative learning assignment participated, but did not feel that it was a “WOW” assignment. Students felt that the assignment was worthwhile but that they were glad it was over. Positive comments included that it was interesting, fun, a challenge, that they had learnt a lot, and had made new friends. However, there were also negative feelings towards the assignment. Students felt that it was demanding, difficult and frustrating and that there were non-participators, free-riders, and students with low commitment. The assignment
described here is the third of three cycles executed in 2005, 2006 and 2007, respectively.

Assignment context

Six teams were assembled, each consisting of three to five Agricultural Management (A) third-year students, three to six Marketing and Sport Management (M) second-year students, and one second-year Information Technology (IT) student at the George Campus of the NMMU (previous PETech). These students had to complete a collaborative assignment in terms of which the A students had to plan the economic viability of the production/manufacturing of a given agricultural product, the M students had to use some of this information to draw up a comprehensive marketing plan for an imaginary new product that could be produced from the agricultural product, and the IT students had to develop a simple e-commerce website to market the imaginary product. The tasks were a slight adaptation of already existing assignments in the different disciplines with the learning of course content and presentation skills being the main aim. By combining these elements, the assignment had the additional bonus of cross-discipline team learning.

Each course-specific subteam had to set up a deliverable that was assessed by their own lecturer. The assignment started in February and the A students had to present their final plan and the M students their intermediate plan during a collective presentation in June. The M and IT students continued with the assignment giving a collective presentation of the marketing plan and the website in September. The presentations were assessed by the three module lecturers, a second M lecturer, an expert on presentations and me. All students had to hand in a post-mortem reflection and a peer assessment to me. The students were assured that the contents of these two deliverables would be kept confidential and that I would only read and assess them after the other assessments.
The task was initiated by the three course module lecturers, the additional M lecturer and me, who explained the aim, task, process, schedule and assessment. This information was also included in an assignment document. Course-specific aspects were facilitated and assessed by the course module lecturers and I addressed the teaming aspects. The timetable included a synchronised 90-minute lecture period for the teams to meet and work co-located on the assignment. I monitored the meetings and their participation, and held brief weekly discussions with each team leader.

Each student’s final marks for the assignment was a combination of a mark for the course-specific subteam deliverable, the presentation(s), teaming participation (assigned by me for participation in the weekly sessions), the post-mortem reflection, and the peer assessment. The weighting of the different marks was at the discretion of each lecturer, while the weighting of the assignment in the module mark was between 10 and 25% of the different course modules.

Perceived costs and rewards

The positive margin between the general PCR was large enough to allow for variations in individual student calculations, and still make it worthwhile for most students to participate. On the other hand, as there were non-participators, it must be assumed that for these students the margin was not positive. Owing to the subteam structure, it was possible to earn undeserved rewards from other team members’ contributions, allowing for free-riding and low commitment from some members.

With all the students needing to pass the course modules, and students in subteams being on the same year level for their studies, they had a similar perception of the time and effort costs needed for the assignment and the receiving of marks and gaining of knowledge and skills as rewards. Not all the students attached the same value to the marks or to learning the skills and content, however. On a more personal level, they had a wide spectrum of
interests, personal goals, external courses and personal demands on their time, and differences in course related cultural backgrounds. The teaming and cross-discipline skills added value as all students had a high probability of working with people from other disciplines in their future careers.

Having supervised similar sub-tasks before, the lecturers had experience in the expected task-related costs and rewards and the students were informed accordingly at the initial meeting. The only PCR uncertainty areas for the students were related to teaming and/or aspects related to the students’ personal life. The task-related PCR estimates made by the participating students seem to have been relatively accurate as few students mentioned them as a concern in their post-mortem reflections. The students negatively affected were those who had to redo the poor quality work of fellow students, or who had to complete work at the last minute as a result of tardy workers. They justified these costs by the fact that they had learnt life skills in the process (e.g. “It was difficult to get some students to hand in their work on time, but it taught me some lessons”). The few students who stopped participating during the assignment did so for external personal reasons.

Task

The task was a combination of three similar tasks done in the different courses in the past and represented simplified versions of industry tasks. The type of task was reasonable for the maturity level of the students and had a fair rewards versus costs ratio. The work for the tasks was covered in the course modules, and the tasks were structured and did not have a high difficulty level. The students were new to this type of task, but this was taken into account in the mark calculations and the support given by the lecturers. The products were real agricultural products and there was an element of fun in that the teams could imagine some unique new product they would manufacture from the agricultural product and how they would market it.
Self

The students did not need to incur any additional costs in terms of acquiring knowledge and skills for the assignment, as the task was based on coursework that had been covered in class. All students in a subteam were on the same study level, but they were each unique in terms of aspirations, ability, personality, attitude, personal goals, motivation and commitment to the task. Each student also had his/her own personal life which exerted different levels of pressure on the amount of additional time available for the assignment. Therefore, the factors contributing to the costs and rewards, and the dimensions of each factor, were unique to each student.

Weaker or less assertive students often did not feel confident in voicing their opinions in the teams. Sometimes the more dominant students ignored the contributions made by weaker students, resulting in them not feeling appreciated or needed in the teams and withdrawing, albeit not stopping their participation altogether. They were marked down in the peer assessments, contributing to the vicious circle of low self-esteem–low marks. The high costs of this factor lie in the frustration, anger, disappointment and loss in self-esteem in weaker students. The stronger/more dominant team members also felt frustration at the disparate contribution, but did not necessarily understand the reasons, nor did they have the skills to handle the situation. This was one of the weak points of the assignment and affected the PCR calculation for all.

Not all the students felt confident in presenting their work. As all the students had to participate in the presentations, their underperformance could affect the team’s marks for this section of the assignment, and they could lose face with their friends, team mates and/or class members. The costs for each student varied from practically no impact on the PCR calculation to a high cost depending on the stress they experienced.
Value of time

The time frame for the assignment spanned several months. To minimise the intrinsic cost of time, students were given a 90-minute synchronised, supervised lecture period per week to work collectively on the assignment. Because the time frame was long the students could manage their personal time so that the extra time for the assignment did not have to consist of highly valued time. The only exception here was tardy workers who affected the team leaders and IT students in that they had to spend more highly valued time to try and finish the presentations and websites in time.

Teams had to appoint team leaders who managed the task and teaming. This allowed students to use their assignment time relatively efficiently and effectively, thereby minimising costs. Several of the students mentioned the value of the team leader. Wasted time was mostly caused by fellow students not attending meetings, not giving information on time or not giving the correct information.

Uncertainty

Uncertainty was minimised so it contributed little to the cost calculation. Similar tasks had been executed in previous years; the subtasks were relatively straightforward; and the lecturers were available weekly during class and consultation hours. If needed, each course-specific deliverable could be completed by one of the students in the subteam. The teaming aspect contained a level of uncertainty, but this was, likewise, minimised by my supervision in the assigned lecture periods. The course module lecturers were also available to solve subteaming problems. Writing post-mortem reflections was unknown to the students and carried a level of uncertainty, but the mark weight was low, limiting their impact on the final mark.
Expectations

Students in the same course had some indication of what they could expect from their fellow students, having studied in the same class (fewer than 40 students) for more than a year. Still, some of the team leaders and IT students stated that the quality and timeliness of the work of some of their team members was below expectation. This was costly, but could be corrected so it did not affect the mark reward. Knowledge about the team members in the other courses was sparse, but the mark for cross-teaming aspects carried a low weight in the total assignment mark. In general, unmet expectations seem to have had little effect on the PCR calculation of each individual student.

Expectations of the facilitation and support of the lecturers had a high level of certainty, as all three lecturers had lectured at the NMMU for several years. Expectations of fair assessment for the presentations was realised with a team of six assessors. The assessment of the course-specific deliverables was done individually by each course lecturer, who was available for discussion if subteams did not agree with the mark. If no agreement could be reached students could ask for a second opinion, although this proved not to be necessary in this assignment.

Fairness

The lecturers had past experience of similar assignments so the time the students needed to invest to reach the deliverables was fair in terms of the marks, learning rewards and ability to receive the rewards. Unfortunately, there was room for unfairness in the execution of the assignments. Because members were assigned randomly to the subteams, each subteam had stronger/committed and weaker/uncommitted members and some subteams had more stronger/committed and others more weaker/uncommitted members. This had an effect on the PCR for each individual student. However, some of the costs incurred by the harder working students, namely, time, effort, stress and frustrations, were offset by intrinsic rewards such as more teaming skills and course content learning, and
higher self-actualisation. The leaders generally had to work harder than the rest of the team, but this was offset by the learning experience of being a team leader and was not compensated for in the assessment and mark allocation.

All students received the subteam’s deliverable and the team’s presentation marks. This opened up the opportunity for free-riding, low commitment, hoping to earn free rewards and the “sucker effect”. To address the unfairness inherent in harder working members as opposed to less committed members, students had to rate the contribution of each other team member in a peer assessment which was included in the final mark for each student. The peer assessments were frank and generally correlated with the other lecturers’ and my perceptions of participation. Although the free-riders were marked down in the peer assessments, they unfortunately, still received some of the subteam and team rewards with little contribution to the costs.

**Teaming and team members**

The stakeholders comprised the students, lecturers, future employers (external stakeholders who benefited from better prepared students), and the NMMU (enhanced image for supplying well-prepared students).

The students’ *self* could be either advantageous to the rest of the team by decreasing costs and increasing rewards through commitment, reliability, valuable contributions and positive motivation; or could be costly and reduce rewards through lack of input, wasting members’ time, and needing motivating and monitoring. Although there was a peer assessment at the end, the disparity caused frustration, unhappiness and conflict during the assignment.

One effect of the random choosing of team members was the distribution of stronger/committed and weaker/uncommitted members in teams. In the teams where the stronger student(s) took over responsibility for the deliverables, the weaker students might have obtained a higher subteam mark than they deserved, but received lower learning rewards by being excluded from tasks, and were
penalised in the peer assessments. This caused frustration, and as mentioned under “Self” above, was one of the weak points of the assignments. In the course modules where the assignment weighting was relatively large, it can be argued that it also contained an unethical element.

Intra-subteam impact on each other’s costs and rewards was limited. A large portion of the marks was assigned to a subteam for their course-dependent deliverable. When information was not forthcoming from the other subteams, students improvised at the cost of losing some continuity in the presentations.

Collaboration had advantages in that there were more ideas, learning from each other, learning about other disciplines, learning to work together with people from another discipline, distribution of workload and new friendships. In some teams cohesion developed among the committed students regardless of their discipline. Disadvantages included extra time needed for meetings and communication (minimised by weekly synchronised lecture periods), and being dependent on team members.

Although some conflict occurred, it was not serious enough to require lecturer intervention and none of the students reported on it in their post-mortem reflections. Respect for some members increased and in other cases decreased due to member conduct. The lack of uncertainty largely reduced the need for trust. Whether goodwill was built among team members was not investigated and, although the synergy attained was not high in practically all the teams, most students felt they had benefited from their participation.

The only loss of a team member that had any impact on a team was the loss of an IT student. This occurred over the June recess, but was solved by a stronger IT student adopting the team. In the worst case scenario, the team could continue without an IT student and their team marks adapted accordingly.
Conclusion

To summarise, an analysis of the PCR showed that the students managed to make reasonably accurate cost and reward estimates, as the only ones that stopped participating did so for external reasons; time and uncertainty costs for most students were minimised; few expectations were not realised; and the type of task allowed for a fair reward versus cost ratio. The greatest shortcomings seem to have been, firstly, that the subtasks could be done by single students, thus not needing all the subteam members, especially not the weaker ones. Secondly, by randomly assigning students to subteams the teams had an uneven distribution of stronger/committed and weaker/uncommitted members, resulting in unfairness, undeserved rewards and costs in terms of frustration, anger, disappointment and a loss in self-esteem.

To increase the positive PCR margin, the following improvements could be considered: giving students teaming training; assigning members to teams according to more specific criteria; changing the task to enable more individual accountability in the subteams and allowing each student to be needed and to play a role in the teams/subteams. Greater lecturer involvement would also have allowed for addressing non/low participation early on.

This discussion gave only a preliminary overview of the reasons that explain why the interdisciplinary assignments were successful, but did not attain a “WOW” status. Applying the PCR theory uncovered the preliminary areas that contributed most to reducing the positive margin between perceived costs and rewards.

8.3 Related theories

8.3.1 Economic cost-benefit analysis (CBA)

In its simplest form CBA uses a common unit, usually monetary, to express all the different costs and benefits. Costs and benefits can be direct and tangible (immediate calculable monetary value), indirect and tangible (rent and
administration costs that often need to be distributed over several processes carried out by an organisation), or intangible (difficult to quantify in monetary terms, such as improved accuracy and efficiency, goodwill and improved customer service) (Holt & Elliot, 2002; Marchewka, 2006; Schwalbe, 2006). If the financial benefits exceed the costs, the project or services can be accepted and/or continued (Burke, 2003; Holt & Elliot, 2002). The costs incurred in the past (sunken costs) and savings already made (realised benefits) in the past are not included in each new calculation. The final CBA occurs on completion when the actual costs can be compared to the actual/estimated benefits and the whole CBA process itself can be evaluated (Lagas, 1999).

CBA corresponds to the PCR theory developed in Chapter 7 in that it calculates an estimated cost and benefit (rewards versus costs) value in making a decision. The estimated costs and benefits change over time and the participants differ in their perception of the value of the different factors. The major differences are that in PCR all the costs and rewards cannot be identified, or dimensionalised according to a single unit; monetary values do not necessarily play a role; and past investments contribute to the PCR. PCR involves a single participant who calculates the PCR to decide whether to start or continue participating in some activity.

8.3.2 Rational choice and decision-making theories

Rational choice theory is an element of many behavioural theories, such as behaviourism, learning theory, exchange theory, equity theory, operant conditioning, and behaviour modification (Nye, 1982). It is based on the principle that if an individual has to choose from a range of possible actions, s/he will choose the action that contributes most to the realisation of his/her own goals (Beed & Beed, 1999; Dupré, 2001). Rewards are seen as those things which humans desire and are willing to incur some costs to obtain. These could, for example, be related to specific goals such as good health, status or material
enrichment (Hunt, 2005). Rational choice is inherent in life, for example, children are conditioned from an early age to realise that the possible short-term joys of bad behaviour will be punished, whereas the costs that might be attached to good behaviour result in rewards, or the absence of punishment (a benefit as punishment might carry a higher cost).

Many variants of rational choice theory exist. In the older versions humans were assumed to have the evaluative processes needed to assess the potential results of choices made. The more modern versions accept that the consequences are not always known, so humans make subjective assessments of the probability of a consequence occurring (Beed & Beed, 1999). In the example of children’s behaviour above, the probability of receiving punishment and its severity are not necessarily certain and depend on many other aspects than just the action.

The major criticisms levelled at rational choice theory (Hindmoor, 2006) are that people do not always make a rational choice when they try to select the best action; people do not always act in instrumentally rational ways; people are not exclusively self-interested; in focusing on the individual, the theory ignores the institutional, cultural and social constraints that exert influence; it denies freedom of will and individual creativity; and it promotes private ownership, competition and incentives.

Rational choice has been severely criticised from an altruistic viewpoint, claiming that people do not always act out of self-interest. The more historical view holds that a human being will choose the option that maximises his/her own benefits versus costs. According to the theorists this excludes altruistic motives such as making other people happy or trying to do the right thing. Recent widening of the self-interest criterion makes provision for the inclusion of irrational and altruistic behaviour, as well as qualities such as commitment, and norms. It is accepted that humans might choose actions that are based on moral motives and are contrary to own self-interest (Beed & Beed, 1999).
My contention here is that altruistic actions have a component of self-interest. What about the assertion that “to give is better than to receive”? Does not making another person happy carry a reward of happiness for the giver so inclined? Others might not care to try and make someone happy. This is also illustrated by Beed and Beed’s (1999) example from Badhwar (1993) of gentile rescuers of Jews in Europe during the Second World War. The rescuers were predominantly Christian and their reason for the rescue was that their sense of self-worth and self-interest required it. Is our understanding of the costs and benefits of altruistic behaviour not very limited and our view of perceived costs and benefits far removed from reality? This would be an interesting topic for future research.

In an alternative to rational choice, Zey (1992) promotes decision-making theory. According to her, decision makers, to the best of their ability:

- Thoroughly investigate a wide range of alternative options.
- Investigate the full range of goals.
- Carefully weigh up what they know of the costs and risks of negative consequences, as well as the positive consequences of each option.
- Search intensively for additional information to be able to further evaluate the alternatives.
- Correctly assimilate and take note of new information or expert judgement they are exposed to.
- Re-examine the options.
- Make detailed provision for implementing or executing the chosen option, with special attention given to required contingency plans if known risks were to appear.

In situations where the decision has far-reaching results, individuals often go to the lengths suggested by decision-making theory in order to make the best decision. I maintain, however, that in daily life where the individual needs to make constant
decisions, very few warrant the extensiveness suggested by decision-making theory. It would be impossible to make most decisions by considering all possible alternatives. Individuals do not have all the information or time needed, and costs and benefits are often perceived rather than accurate. Individuals often act on their gut feel and having to gather all the information could be more costly than making a wrong decision.

The rational choice and decision-making theories are similar to PCR theory in that a decision needs to be made; social factors play a role in the decision; and the costs and rewards are not certain or accurate. PCR theory differs in that the individual does not have to choose the best option from several alternatives, but only whether to participate/continue to participate or not; stakeholders’ PCR are affected by other stakeholders in the team; the PCR calculation only includes the aspects pertaining to calculating the PCR for participation and is more interested in the margin between costs and rewards than in the exact calculation of the costs and rewards. It is also not a once-off decision, but a decision that recurs throughout the task.

8.3.3 Social exchange and social choice theory

Nye (1982) proposed a social choice theory (the name for this theory is improper as social choice refers to another theory that already existed when Nye proposed his theory [Haake, 2004]). The most general proposition of the theory is the following (Nye, 1982:14): “Humans avoid costly behaviour and seek rewarding statuses, relationships, interaction, and feeling states to the end that their profits are maximised. Of course, in seeking rewards they voluntarily accept some costs; likewise in avoiding costs, some rewards are forgone, but the person, group, or organisation will choose the best outcome available, based on his/her/its perception of rewards and costs”.

The concepts used by Nye (1982) stem mostly from the psychologists Thibaut and Kelley (1959) and sociologist Homans’s (1961) general theory of social behaviour
and social structure, known as the social exchange theory. The theory was extended by Blau (1964) and rephrased by Homans in 1974. Several books have been written on the theory, for example, Chadwick-Jones (1976), Ekeh (1974), Skidmore (1975) and Gergen, Greenberg and Willis (1980). The theory is limited to exchanges between individuals and describes the relationship between rewards and the probability that a person will perform a specific action.

Although Nye (1982) based his social choice theory on the theory of Homans, he maintained that it is much broader than exchanges between individuals. His concepts and propositions include the following:

- Individuals choose the alternatives with the highest expected profit.
- If costs are equal the option with highest anticipated rewards is chosen.
- If rewards are equal the option with the lowest costs is chosen.
- If immediate outcomes are equal the option with the better long-term outcomes is chosen.
- If long-term outcomes are perceived to be equal the option with the better immediate outcomes is chosen.

If costs and rewards are equal then

- The option expected to supply the most social approval is chosen (or least social disapproval).
- The statuses and relationships that provide the most autonomy are chosen.
- The option with the least ambiguity in terms of expected future events and outcomes is chosen.
- The option that promises the most security is chosen.
- The people to associate, marry or form relationships with are the ones whose values and opinions are most in agreement with own.
• The people to associate, marry or form relationships with are the ones equal, rather than those above or below.

• The option is chosen with the greatest financial gain and least financial expenditure.

The PCR theory developed in Chapter 7 does not encompass an exchange as in the exchange theory, nor does it require a decision being made in terms of a choice from several alternatives. It is an internal calculation in one individual resulting in a decision to participate/continue to participate or to stop participating.

### 8.4 Conclusion

In this chapter the transcending nature of the PCR theory generated in Chapter 7 was investigated. It was shown that the theory has applicability in explaining participation in multidisciplinary co-located collaborative learning assignments where the distance component of DCLAs (Chapters 4, 5, and 6) was replaced by student subgroups from different course disciplines. With the help of the PCR theory it was shown that the lack of the “WOW” factor in these assignments can be attributed to the fact that all the subtasks could be done by individuals leaving most of the weaker students without a purpose in the team, thereby eliminating rewards such as a feeling of accomplishment, belonging to the team, and a feeling of self-worth. It also frustrated the stronger members who felt that it was unfair that the weaker students should share in their rewards without contributing towards the costs.

In conclusion, the related theories of economic CBA, rational choice theory, social exchange theory and Nye’s social choice theory were briefly investigated and the differences between them and the PCR theory highlighted. This concludes the research presented in this thesis. The final chapter, Chapter 9, reflects on what has been achieved in this thesis, and evaluates the research. It also highlights additional areas for further research.
Chapter 9

Reflection and Conclusion

9.1 Introduction

The research for this thesis commenced when a pre-research study (I was not the researcher for this study, but was a participating lecturer), consisting of four action research DCLA cycles using case studies, had to be terminated because lecturers refused to continue to participate. The costs for the lecturers in terms of time, frustration and conflict were high and escalating, whereas their rewards remained low. In addition, student participation at practically all the campuses was low and most of the students on these campuses viewed the assignment with contempt. Interestingly, student participation on my own campus was high and the students did not view the assignment with the same negativity as students on the other campuses.

I reopened the research with the aim of investigating whether the assignments could be made viable by making them worthwhile for both lecturers and students. Several aspects of the DCLAs could still be improved. To gain an understanding of the factors affecting lecturer and student participation, a study was made of the pre-research cycles, as well as the DCLAs reported on in the literature. Although several literature studies reported on high lecturer costs and low student participation rates, this aspect did not form the focus of any of more than sixty literature research items on DCLAs investigated for this research (see Chapter 3).

In an action learning environment, such as the one the DCLAs were executed in, high student participation is important. Without participation a student not only forfeits his/her own learning experience, but also affects the learning experiences of the other students in the team. A popular incentive employed by lecturers to encourage student participation is to attach a high weighting to the DCLA in the
class mark. This did not, however, have the desired effect and could be seen as being highly unethical, as a student could fail a course module as a result of an assignment s/he had very little control over.

Other incentives for participation included peer assessment and tracking student communication, both of which also proved to be ineffective. Peer assessment was biased in the DCLAs due to a lack of observability, and communication tracking was believed to be intrusive and very time consuming for lecturers (see section 3.5.9). Lack of observability, biased peer assessments and the problems associated with tracking student communication make it difficult to assign individual marks to each student according to his/her contribution to the team. This encourages free-riding, unbalanced participation, dominant students not allowing others to contribute and the sucker effect where a few students in the teams would do the bulk of the work. This unfairness is one of the aspects most disliked by students who do participate and it contributes to the students' negativity towards DCLAs. Participation as covered in the literature and evidenced in the pre-research is discussed in sections 3.5.9 and 4.10 respectively.

Rather than a high mark weighting, the factors that did influence student participation in the literature included a perception of benefits for self and the other collaborating students (Whatley et al., 2006), self-interest, common values, mutual support, demanding tasks, feelings of accomplishment, and feeling part of a successful community (McFadzean & McKenzie, 2001); activities where students felt they could contribute, such as brainstorming (Knoll & Jarvenpaa, 1995), and a high level of lecturer facilitation (McFadzean, 2001a, 2001b; Andrews & Schwarz, 2002). The authors in a substantial number of research studies in the literature (see section 3.5.9) maintain that participants generally felt that the learning aim of the DCLAs was worthwhile. The costs of DCLAs are, unfortunately, also very high, affecting the viability of DCLAs as a learning tool. In some literature studies, however, rather than just tolerating the DCLAs, students seem to have embraced them (e.g. Whatley et al., 2006). This raises the following questions: Why do some
DCLAs have high participation rates and others not? Why do some students participate in a specific DCLA and others not? Why in our pre-research cycles did students on my campus demonstrate a higher participation rate and lower aversion towards the DCLAs than at the other campuses (see section 4.10)?

From the lecturers’ point of view, participation proved to be very costly in terms of time investment (see sections 3.5.7 and 4.8). Without lecturer participation on all the campuses, the DCLAs could not be executed. Although students preferred high lecturer involvement and this contributed to a higher student participation rate (Birch & McDonald, 2007), it also increased the cost for lecturers who had little to gain personally from the DCLAs. Eventually, the pre-research at the PETech had to be terminated owing to lecturer dissatisfaction with the high time costs. This was also prevalent in the literature where the demands on lecturer time were high even with a small number of teams (Hoag & Baldwin, 2000; Alexander, 2002; Sullivan et al., 2004; Taylor, 2005; Olson-Buchanan et al., 2007). This aspect is discussed in more detail in section 3.5.7. To make the assignments viable, lecturer costs would have to be minimised without affecting the students' willingness to participate.

Attempts in the pre-research to improve participation rates by changing one factor had a ripple effect, negatively affecting several other factors. The factors proved to be numerous and tightly interlinked. Thus, to enable us to improve the participation rate of lecturers and students, it was important to understand the reasons for participation/non-participation. This led to the research question:

*What factors affect the lecturers’ and students’ participation in the DCLAs and how are they related?*

A better understanding of the factors would allow DCLA coordinators to make the DCLAs more worthwhile for lecturers and students to participate in. It would also have value in the planning stage of a DCLA in terms of viability and before costly mistakes are made.
The remainder of this chapter is devoted to discussing the success of this research in answering the research question, the contributions made to the existing body of knowledge, the research presentation followed in this thesis, the limitations and restrictions of this research study, and the lessons learnt. The thesis concludes with some final remarks.

9.2 Review of the success of this research study in answering the research question

With the knowledge gained from the pre-research and the literature study, an additional DCLA cycle was planned and executed with students from two campuses of the PETech participating. Several new problems surfaced during this DCLA, severely affecting student participation at one of the two campuses (see Chapter 5). The problems affecting the first additional cycle were again identified and several addressed for a second additional DCLA cycle. Even though some of the problems that were specified by the students as reasons for their non-participation could not be improved on, this cycle had, to our surprise, a very high participation rate at both campuses with only one out of sixty students not participating (see Chapter 6). In a questionnaire administered after the completion of the DCLA, 79% of the 43 students who had filled in the questionnaire felt that the assignment had been a success, 67% felt it had been enjoyable and 65% felt that it had been worthwhile. In an open-ended question on their main reasons for participating, students placed marks low on the list. Although important, other aspects such as a task that is worthwhile, learning rewards and social reasons carried greater weight (see section 6.11).

A descriptive account of the factors affecting the execution of the DCLAs in the pre-research is given in Chapter 4, and the two additional cycles in Chapters 5 and 6 respectively. These give insight into the factors affecting lecturer and student participation in the DCLAs executed at the PETech. Although this has value for understanding the reasons for lecturer and student participation in the specific
DCLAs, the descriptive account has limited value for understanding, interpreting, explaining and predicting participation in DCLAs in general. The description is tightly bound to time, place and people. As each DCLA is uniquely determined by numerous factors, the dimensions of the factors, and the interrelationships between them, this poses a problem for descriptive reporting. It underscores Glaser’s argument that “[c]areers in description can go on forever as descriptions can go on and on and on” (2001:30).

The GGT method allows for conceptualisation right from the start, and therefore, allows theory which is abstract in terms of time, place and people to emerge from the collected data. By applying the GGT method to the data collected in Chapters 3 (literature study), 4 (pre-research DCLA cycles), 5 (first additional DCLA cycle) and 6 (second additional DCLA cycle), a perceived costs and rewards (PCR) theory for participation in DCLAs emerged. This theory is presented in Chapter 7.

The core concern of the stakeholders in deciding whether to participate or not in the DCLAs is addressed by the core category of the PCR theory, namely, perceived costs and rewards. As long as the perceived rewards outweigh the perceived costs the stakeholders will participate or continue to participate. As soon as the perceived costs overtake the perceived rewards the stakeholder will stop participating. All the aspects constituting the cost and rewards are often not known to a stakeholder and those that are known are often intangible and are not defined in terms of one common unit by the stakeholder, for example, enjoyment, skills gained and frustration. Hence they are viewed as being perceived rather than actual costs and rewards.

The costs and rewards are highly individual to each stakeholder, which explains why some students will participate and others not in the same DCLA (different aspects constituting the perceived costs and rewards); why the students at my campus had a higher participation rate and lower negativity towards the assignment in the pre-research than the students on the other campuses (I had
promised that I would not let the marks of the assignment negatively influence their course mark, thereby reducing possible costs of participation – see Chapter 4); why some DCLAs in the literature had higher participation rates than others (the rewards versus costs ratio was more favourable); and why the last additional DCLA cycle had such a high participation rate, even though some of the aspects that were blamed for non-participation in the previous cycle could not be corrected (some of the other measures that were implemented increased the overall rewards and reduced the overall costs making the assignment worthwhile – see Chapters 5 and 6).

Marks form only part of the rewards. Rewards also include aspects such as feeling of accomplishment, enjoyment, feeling of belonging to a successful community, and feeling of self-worth and pride when a good contribution is made. This explains why a high mark weighting alone was not successful in encouraging students to participate.

The additional categories that emerged from the data and that were included in the PCR theory are the characteristics of the task (e.g. a structured task carries less time costs than a corresponding unstructured task which requires time to clarify the requirements of the task); aspects of a stakeholder’s “self” (e.g. communication skills); the intrinsic value of time (e.g. the costs of time are less when students work on the assignment in class time than when they have to work on the assignment when they also have to study for a test); uncertainty (e.g. not knowing the students on the other campus increases the level of uncertainty in a DCLA compared to a similar co-located task); expectations (e.g. students expect fellow students to deliver their contributions on time; if not it can be very costly to the remaining students in the team); fairness (e.g. students become very upset when a free-rider is not penalised, but shares in the team’s marks, receiving rewards for little or no costs); and interaction with other stakeholders (e.g. conflict is very costly to resolve online, therefore students tend to avoid conflict and accept
recommendations from other students without much argument, thereby balancing
the perceived costs of the conflict with the possible perceived rewards).

Although the perceived costs and rewards are unique to each participant, and
cannot be determined accurately by the coordinator, the coordinator can identify
factors that contribute to the general costs and rewards of participating in DCLAs.
By minimising possible cost factors and maximising possible reward factors the
coordinator can ensure that the positive general margin, in terms of rewards
outweighing the costs, is as large as possible. A large positive general margin will
make provision for a positive perceived costs and rewards calculation by most of
the individual stakeholders, making the DCLAs worthwhile to participate in. If the
analysis of costs and rewards indicate that the margin is small, or negative, the
DCLAs have to be redesigned to increase the margin. If this is not possible the
DCLAs are not viable and should be abandoned before costly mistakes are made.

In the second additional DCLA cycle, the high participation rates proved that the
DCLAs can be made worthwhile for students. The same could not be said for the
lecturers. Although the costs were minimised as far as possible, there were still
recurring costs that were higher than the rewards, which remained low. The only
option was for the faculty to increase the rewards in some other way. For the
faculty, the rewards of including the DCLAs in the ICT course were low (this could
differ for other types of courses), not warranting the investment in additional costs.
The DCLAs were terminated after the second additional DCLA cycle, although
research continued at my campus with multidisciplinary co-located collaborative
learning assignments (briefly discussed in Chapter 8).

The criteria Glaser presents according to which GGT is to be evaluated are fit (fit
reality in the eyes of the subjects, practitioners and researchers in the area);
workability (explains the major variations in behaviour in the area with respect to
the major concerns of the subjects); relevance (if it fits and works it has relevance);
and modifiability (if new data warrant modification). In GGT, fit, workability,
relevance and modifiability are ensured by the emergence of the theory from the data through the rigorous application of the GGT method (Glaser & Strauss, 1967; Glaser, 1978; 1992; 1998; 2001). In this research study the PCR theory for participation emerged from the data through the application of the full GGT method to secondary data collected in the research area. Fit was further tested by discussing aspects of the theory with students and colleagues. Considerable excitement in the application of the theory displayed by the students and colleagues attested to the value of the theory in understanding, explaining, interpreting and predicting participation in assignments and other applications.

From the summary above it can be concluded that the PCR theory is successful in answering the research question in that it defines the factors (on a conceptual level) that affect lecturer and student participation in DCLAs, and how they are related. The power of PCR theory is shown in its ability to explain, understand, interpret and predict participation in DCLAs (see section 7.3). An understanding of the cost and reward factors allows the participants to manipulate the costs and/or rewards where possible, or to make more informed decisions on participation/continued participation.

9.3 Contribution made by this research study

This research study contributes to the existing body of knowledge on two levels, that is, the theoretical and the practical.

9.3.1 Theoretical contribution

The value of this research lies in the contribution it makes to the existing body of knowledge in the technology mediated education realm in terms of a PCR theory for participation in DCLAs.
9.3.2 Practical contribution

On a practical level this research study provides a PCR theory that can be used to explain, understand, interpret and predict participation in DCLAs. By adhering to the GGT method of constant comparison and interchangeable incidents, the theory is highly modifiable and can be modified or extended through future research to be applicable in other substantive areas where stakeholders have to make decisions on participation.

This research study also contributes in the identification of elements that contribute to the costs and rewards of lecturers and students in DCLAs. It refutes the belief held by many lecturers (see discussion in sections 3.5.7 and 6.11) that a high mark weighting can be used to ensure student participation. This has changed the way I and some of my colleagues view and plan group assignments.

9.4 Research presentation

The research was introduced in Chapter 1 and the methodology and underpinning philosophies discussed in Chapter 2. Chapter 3 was devoted to the literature review, which was followed by Chapters 4, 5, and 6 in which the data generation phases, that is, the pre-research DCLA cycles and the first and second additional DCLA cycles, were discussed respectively. The PCR theory for participation which emerged by applying the GGT method to the data described in the four previous chapters was presented in Chapter 7. In Chapter 8 the applicability of the theory to multidisciplinary co-located collaborative learning assignments was briefly investigated as well as existing related theories. In this final chapter, Chapter 9, the major findings are presented and the research study is reviewed.

9.5 Limitations and restrictions

Educational research is limited by the environment, which is forever in flux. The first set of limitations is related to the environment:
I, as the researcher, coordinator and participating lecturer, formed part of the research setting and influenced the setting; I was not an independent observer.

The choices of a research setting for a DCLA are limited in an educational environment.

Each DCLA is unique and not reproducible.

There are ethical issues involved in conducting research in an educational setting where the marks can influence whether a student passes or fails a course module. This limits the mark weighting that can be given to DCLAs.

The virtual component added the limitation that the teaming could not be observed for research purposes.

The restrictions and limitations of the research setting are relevant for the descriptive chapters (Chapter 4, 5, and 6), but they do not pose a problem for the development of theory using the GGT method. GGT transcends the data; is conceptually abstract in terms of time, place and people; and looks at the underlying concepts. Therefore, “all is data” (Glaser, 1998) (see Chapter 2).

In addition to the environmental limitations given above, this research posed three methodological limitations. Firstly, this is my first GGT study and as a researcher new to GGT, and finding myself in a “minus-mentoring” situation in terms of GGT (term coined by Phyllis N Stern [Glaser, 1998:5] to refer to researchers who “are doing grounded theory in a context where there is no one available to train them how to do it”), I had to teach myself GGT from books. Glaser (2001:6) contends that “[t]he whole GT package is hard to understand without much experience”. Strauss, as one of the two creators of grounded theory, did not understand the GGT method even after co-authoring four books with Glaser (Glaser & Strauss, 1965; 1967; 1968; 1971; Glaser, 1992). I had to learn GGT “by action … conceptualisation emerges from action, not from reading books how it can be
achieved” (email from Glaser to Fernández as quoted by Fernández, 2003:299). My own understanding of the GGT method only came by doing, by trial and error, by rereading Glaser’s books and other articles and books, by revisiting the data with new insights on what is meant by conceptualisation, and by rewriting the theory several times. I had one advantage in that, although I investigated other QDA methods briefly, I do not come from a QDA background, and I was not exposed to methodological pressure and advice from people trained in QDA during the GGT phase of this research. My inexperience in GGT was a limitation, however, and carried a high cost in terms of additional time spent on this research study.

The second limitation was that I had a substantial knowledge of the area under research as I had conducted an in-depth literature study before embarking on the GGT phase of this study. Hence, I could not enter the GGT research with a clean slate and without a literature review. Glaser (1998:67) warns that: “Grounded theory’s very strong dicta are a) do not do a literature review in the substantive area and related areas where the research is to be done, and b) when the grounded theory is nearly completed during sorting and writing up, then the literature search in the substantive area can be accomplished and woven into the theory as more data for constant comparison”. Glaser’s reasons are that the researcher can be grabbed by received concepts that are not relevant and do not fit; can develop a preconceived problem that is not relevant; can become imbued with speculative, non-scientifically related interpretations and connections that are not relevant; can become “awed out” by other experts; can become rhetoricalised and review literature that is not relevant. This problem could not be avoided in this thesis. Fortunately, the core concern of the stakeholders, namely, “participation”, was highly evident from the pre-research. The in-depth study and literature review were done after the core concern had been identified. On the other hand, the advantage of my extensive knowledge of DCLAs was that I had a thorough understanding of the participation concerns that emerged during the execution of
the DCLA cycles, having experienced them myself as one of the subjects in the research area.

The third limitation lies in the way the GGT is presented in this thesis. One of the main problems of GGT is that the method does not conform to the traditions of doing PhD research. This problem is discussed at length in Glaser’s book *The Grounded Theory Perspective: Conceptualization Contrasted With Description* (2001). It is a problem experienced worldwide by practically all students who have to comply with faculty requirements that are based on traditional ways of doing research. This was also discussed at the grounded theory seminar I attended in New York, in October 2006. In a study conducted with GGT, the literature study of the research area is delayed until later in the research after the initial theory has been formed. In addition, the research question is not formulated beforehand, but emerges as the concerns of the participants in the research area emerge from the data. The data collection is also not defined beforehand, but is driven by the emerging theory, and the write-up should not have a literature review chapter, but the literature should be woven into the storyline (similar to the books written by Glaser and Strauss [1965; 1968; 1971]). Additionally, the criteria for judging the theory are completely different to those used for QDA or positivist statistically based research.

The student has the option to either try and convince the faculty and the examiners (very difficult as the student is in the “student role” and the faculty and examiners in the “assessor role”), or to try to comply with the faculty’s traditional requirements as closely as possible (recommended by Glaser in situations where fighting the faculty would be difficult, impossible or impractical – discussed at the grounded theory seminar I attended in New York). I followed the latter option in complying with faculty specifications, but this complicated the writing of this thesis in terms of focus. As I became familiar with the GGT method, the reasons for Glaser insisting that GGT should be written with the literature integrated into the theory became more meaningful.
9.6 Lessons learnt

The discovery of the real reasons why students participated in DCLAs, and of planning and executing the last DCLA cycle, which had an extremely high participation rate and was highly acclaimed by the students, was very exciting. The excitement waned when I, as an inexperienced researcher in the GGT method, encountered the obstacles presented by learning how to apply it.

My first mistake, which wasted a considerable amount of time and caused a great deal of frustration, was to try to apply a mixture of Glaserian and Straussian grounded theory, wrongly believing that they represented the same method. Confusion about the two methods is rife in the research community and led me to write a paper that was presented at the 2009 Annual Research Conference of the South African Institute of Computer Scientists and Information Technologists (Van Niekerk & Roode, 2009) entitled “Glaserian and Straussian grounded theory: Similar or completely different?”. Hopefully this paper will allow future grounded theory researchers to make an informed decision about which method to follow right from the start.

After reading Glaser’s antipode to Strauss and Corbin’s book, and investigating the two methods, I decided to follow the Glaserian method (see section 2.6.5). However, I was totally unprepared for the difficulty I would encounter in learning how to apply the GGT method, lacking an experienced GGT mentor. Glaser contends (2001:10) that “33 years after ‘Discovery of GT [grounded theory]’ was written, many social researchers still have little or no awareness of conceptualisation, conceptual levels and, therefore, the integration of conceptual hypotheses”. Because of the complexity, Glaser found it necessary to write an entire book on this topic in 2001. The problem is not insignificant, as Strauss, who was one of the two creators of the original grounded theory, did not understand the essence of the method himself and developed the second grounded theory version as a result. The rules of GGT on how to ground the theory in the data are rigid, but
only guidelines are given on how to conceptualise and weave it together again using the theoretical codes. This has also added a high level of uncertainty to this research study.

I learnt GGT though trial and error and by rereading Glaser’s books repeatedly, as well as other books where GGT was applied. This absorbed a substantial amount of time and caused a high level of frustration and uncertainty. Had I known this when I made the decision to use GGT, I might have succumbed to using the more rigid Straussian method instead. In hindsight, I am glad I did not know, as I would have lost out on learning a very useful method which I will use again in future research endeavours. The creation of theory is addictive and exciting, and the mastering of GGT, although challenging, is very rewarding.

9.7 Future research

The research for this thesis created several new research opportunities.

**Theoretical:**

- The PCR theory is currently limited to the DCLA data it emerged from. The theory can be modified and extended using new data from new DCLAs executed in new settings.

- The modifiability of grounded theory allows PCR theory to be raised to a higher conceptual level, called formal theory, with additional research in different areas where stakeholders need to decide on participation. Glaser and Strauss lifted their theory on *Awareness of Dying* (1965) and *Time for Dying* (1968) to the formal theory of *Status Passage* (1971).

- PCR theory is based on the perceived costs and rewards calculation for participation. In common with Glaser and Strauss’s two books *Awareness of Dying* (1965) and *Time for Dying* (1968), a theory could possibly be written using another category as core category which is latent in the rich data collected.
• The literature review uncovered many underdeveloped areas that still need further research (see Chapter 3).

**Methodological:**

• The GGT methodology could be applied to create theory in other areas of education, especially where data are generated by action research cycles.

• The Straussian and the Glaserian methods could be applied to the same data to demonstrate the differences in approach and results.

**Practical aspects of DCLAs:**

• DCLA-specific research: Conduct research to gain a better understanding of the factors that constitute the perceived costs and rewards for the different stakeholders in a DCLA. A better understanding of all these factors would enable organisers of DCLAs to avoid costly failures and enable them to make the assignments worthwhile for all stakeholders. Possible questions could include: What are the exact factors affecting the perceived costs and rewards of participants? How does a student incorporate intangible factors into the PCR calculation? What are the triggers that change a student’s motivation to participate? What role does mark weighting really play and when does it motivate participation and when does it become unethical?

• Although participation and student satisfaction were high in the second additional cycle, the virtual teaming learning was substantially lower than in the first additional cycle with all its problems. The question arises as to how a high participation rate can be obtained while still having a high level of virtual teaming learning.

• In the first additional cycle the students encountered several problems in terms of the task and teaming, which allowed for a substantial amount of virtual teaming learning. The question arises whether problems should be built into the assignment on purpose and to what lengths this would be
productive or counterproductive and how it would affect the PCR of the students.

- In DCLAs there is misalignment between the lecturer’s aim of virtual teaming learning and the student’s focus on the deliverables of the task. This is also apparent in the assessment. The question arises as to how the aims, task and assessment can be aligned.

**Practical use of PCR theory:**

- Several discussions held with students, colleagues and people in other research areas have ended in excitement regarding the applicability of the PCR theory in explaining, understanding, interpreting and predicting participation in other substantive areas. Research could be undertaken where PCR theory is applied to other areas to gain understanding and/or predict participation. This was briefly touched on in Chapter 8 where the PCR theory was used to explain why the students tolerated a multidisciplinary co-located collaborative learning assignment executed at the G campus of the PETech/NMMU, but did not feel that it was a “WOW” experience.

### 9.8 Concluding remarks

This chapter reflected on the research study. It gave a short overview of the background and motivation for this research, the research question and a discussion on the success of this research in answering the research question. This was followed by a discussion on the way this research study has contributed to the existing body of knowledge on a theoretical and practical level. Finally, the limitations and restrictions of this research study and the lessons learnt were presented. The research uncovered several options for further research in terms of the theoretical aspects of PCR theory, the application of GGT methodology, practical problems experienced in the DCLAs, and the practical application of PCR.
theory to understand, explain, interpret and predict participation in substantive areas other than DCLAs.

This research study has already had value in that some of the problems experienced in the execution of the DCLAs have been the focus of lengthy discussions between my colleagues and me and has changed the way we look at assignments. It has also played a substantial role in determining the format of our third-year team projects which I have supervised in the last few years.

As this point is reached, it must be concluded that during the entire research process my perceived rewards outweighed my perceived costs. I must admit, however, that the cut-off point for continuation was reached on several occasions. The only reasons for continuing were that I did not want to let down my supervisor, who had invested time in my studies; my sponsors and my faculty, which had invested costs in me; my family, who have had to make many sacrifices without rewards; or my friends and colleagues, who have supported me with encouragement and advice and have patiently listened to my exciting discoveries, but also my frustrations. Last, but not least, I did not want to let the lecturers and students down who had participated in the assignments and had given me invaluable data to work with. It would have been an injustice to them to not publish the experiences and findings. I am greatly indebted to all of them.

The research for this thesis was extremely rewarding and I have grown in terms of knowledge, skills and outlook on life. It has also formalised participation issues that will help me in future educational courses. I hope that through the knowledge and skills gained and by publishing this research I will be able to give society some valuable information in return.


REFERENCES


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First Additional DCLA: George Student

**Soft Skills Report**

**E-Commerce Combined Project**

The combined project that was handed to us at the beginning of the semester proved to be more troublesome for me than originally anticipated. As with all things in life one should not take any task for granted which has been yet again proven with this project.

Although my one team member, ******, started out with high goals and objectives it soon became apparent that not all other team members situated in Port Elizabeth shared the same enthusiasm as we did. Due to this fact and a handful of other reasons which will be listed I have to say that I do not think this project was a success.

**Reasons for failure:**

- No communication between individual team members
- Lack of enthusiasm on some team members side
- Complexity of the subject matter
- Conflict with other scheduled projects
- Not being familiar with the other team members.

Even though these are only a handful of the reasons for the project failure they are the most important especially for future reference.

What I have learned through the course of this project can be a book on its own therefore I have decided to name but a few of my experiences and new skills that I have gained in the course of the project.

**Lessons learned:**

1. Always have contingency and fall back plans in place.
   In the case of communication, we only used e-mail, perhaps we could have tried telephone or other means of communication.
2. Do not expect everyone else to have the same degree of interest or commitment than you.

3. Always schedule projects that they do not run concurrently.

4. Try all means to become familiar with the other team members as soon as possible.

5. Motivate other members that are not enthusiastic to see the bigger picture and help them to see that a project is not a punishment but a learning experience.

6. Do not trust anyone to do their part. Always do everything yourself also, as a back up plan.

7. Identify a leader as soon as possible and let all members partake in the selection of one.

8. Ensure that there is clear communication channels between everyone and that people respect the people with authority.

These were just some of my experiences. Hopefully the reader of this report will gain insight on why we did not succeed by reading this and use it for future reference.

Thank you

First Additional DCLA: PE Student

Feedback

Technically I should be able to give lists of reasons about why distributed teams are better and how well the project went. I should be able to say that we could organise ourselves well, that we were more dedicated because we had other people who we were responsible to, or even that we were more productive than if we had been working on our own.

Unfortunately I can say none of this.

I have never battled more with a group project. The project description was totally insufficient and there was not enough communication between lecturers. The project topic was so broad that no one knew where to start looking for information or what exactly was supposed to be researched.
When we tried to find out more details from our PE Campus lecturer, we were told to basically find the generic value chain for our industry (in this case transportation) and each write up a bit about one of the links in the chain. However when we communicated with our team member at the George Campus, we were told that their lecturer had told them to research a value chain for each of the links in our topic’s value chain. Thereby contradicting what our lecturer had told us.

I feel that the PE Campus lecturer was not given the correct information about what the George Campus lecturer expected from the project. I also feel that our lecturer was not kept sufficiently updated about the project progress and decision changes.

**Acquired Skills**

I feel that from the point of view of learning skills, this project has been a total waste. We have worked in groups before and these usually end up behaving like distributed teams for convenience sake. Because of this most of us are used to distributed work and I feel I have learned nothing new from doing this project.

**Methods of Communication**

Our method of communication was email. For the most part it was efficient enough, but had everyone always read and responded to emails, things would have been a lot easier.

Using Net Meeting was not practical except for when it was organised in the practical class, in which case it was fairly effective. It allowed us to establish exactly what was going on, who was doing what and to sort out any problems quickly and easily.

**Working as a distributed group**

In this project I found that my fellow group members were very difficult to work with. One member communicated so seldom with the group that he was essentially a non-participant in any discussion or decision we made. Another communicated slightly more but gave no opinion whatsoever. These two made it very difficult to try and get feedback on suggestions that were made. The George student communicated on a fairly regular basis but did not appear to be open to discussion about the topic. This probably has a lot to do with the fact that the George students knew what was expected of us because their lecturer ran the project and could tell them exactly what she wanted. Their lecturer unfortunately did not pass this information onto our lecturer.

Because the George lecturer did not tell our lecturer exactly what was expected of us, we were unable to give any useful feedback to the George student in our group. This I’m sure led him to believe we were totally uncooperative and had no knowledge of value chains.
Although I cannot speak for the other PE students in my group, I can honestly say that had I known from the beginning what was expected of us, my quality of work would have been better and I would have been more interested in making the project a success.

I have found that students in general do not seem to work well in groups unless they are of their own choosing. Students also don’t seem to feel a responsibility to each other to do their best in order to make projects of this nature a success.

**Recommendations**

In order for this project to succeed in the future, the lecturer running the project should make perfectly clear from the beginning, exactly what is expected of the students and inform all other lecturers involved of this. The students need it to be made clear to them from the very beginning exactly what they are to research and write-up on to avoid a repeat of the confusion that plagued us throughout this project.

**Second Additional DCLA: PE Student**

**Virtual Team Project – Life Skills Learned**

The Virtual Team Project enabled me to learn the following:

**New technology:**

Although I have participated in a virtual team project before this was the first occasion that I used net meeting technologies as a tool. This was not entirely a success as there were limitations to the bandwidth available and we experienced a problem linking to our team member. On the occasion that we did make contact the opportunity to communicate in real time was effective and enabled decisions to be made far more speedily than through e-mail – the medium we relied on the most.

**Importance of introduction:**

The introductory session was curtailed due to technical problems encountered in setting up the net meeting. The area that suffered the most was the introduction of members and I felt uncomfortable not knowing the skill base of the other team members.

I could deduce different characters through their style of writing e-mails – precise and grammatically correct (serious), as opposed to grammatically carefree (all lowercase, no punctuation) – and slot them into a stereotype. At a later stage, well into the project, I decided to make my own move and “discover” my co-members. This was a revelation and I feel having this information might have influenced important decisions made at an earlier stage. I would definitely prioritise this requirement in future virtual team projects.
Make the move:

The previous point illustrates that I felt uncomfortable until I took control of my own issue and acted on it.

Improved search capabilities:

When you have a specific topic to research you need to hone in on search results and learn new techniques to optimise this result. A successful search result for a graphic led me to a site with a wealth of information. I had not previously used this technique. A spin-off of this project’s content search material was the discovery of a whole host of other really effective sites presenting information for home schooling through to specialist material. I am also able to apply the knowledge gained to everyday experiences.

Synchronous communication IS necessary:

Our approach to synchronous communication was not focused (possibly due to net meeting problems). I felt that there were issues that could have been effectively handled through everyone contributing at a particular stage. Real-time, simple answers would have avoided delays in reaching a final decision. Net meeting problems need to be addressed to make synchronous communication a more viable option.

To be disciplined about backup:

I was far more conscious of not letting the team down by losing important information due to sloppy backup practices and distributed material to different locations.

Keep communication records:

Records of communication are important to verify any queries. I kept communication records, but often failed to request a read receipt that left me unaware of whether mail had been received and read. I tried to remedy this but was still forgetting by the end of the project.

To work within your own time frame:

Group members work at different rates and under different stress tolerances. My strategy is to remodel the time schedule and work ahead by a few days, while many people perform at their best under pressure of time. It is a challenge to work under a leader whose decisions influence your actions, when making a decision is postponed to as late as possible. The compromise is to volunteer to do whatever a final decision can be made on.

Some further comments:

I felt that the “virtual team” experience was not a true one for the co-located members. The team split was 3:1, PE:George. It was too easy for the PE group to slip into the familiar pattern of discussion in the lab or lecture room, but then again this split might be the situation for an industry virtual team. Extra effort would need to be exercised in making all members feel equally involved and keeping them up to date on even such issues as how a decision was reached.

The generation gap between members poses its own challenges. While I, as the senior member of the group, felt intimidated by the knowledge and expertise of 3 top students, they might have felt uncomfortable with my seniority and that as students it’s unusual to be in this type of situation.
A more structured approach would have been my preference, but I could sense that this was far from the needs of young students better able to cope with many things thrown their way. The means to the end for each generation can be very different and this might also apply to other differences eg cultural differences.

I felt a nagging insecurity that what I contributed might not be what was required but no team member was prepared to make a definitive statement about this. Each member seemed to reflect a similar hesitation about what they were doing. This would not be acceptable in a real industry project. There would have to be clarity that what was being done was in fact what was required.

The further into the project we moved the more I realised how important the introductory phase was to cover a wide range of issues. It is important to establish a mode of operation and commit to times for accessing e-mail, not just that you will be communicating by e-mail. It is important to know that you are all moving in the same direction and not to leave this to chance.

The group did take a while to start being productive as a team. The group leader was always encouraging as were the other team members. I at one stage wondered whether we would make the deadline, but everything seemed to fall into place as the deadline neared proving that each member has a niche area where they can be of value and that some members are more effective under pressure than others.

Suggestions for future teams:

The team members should be encouraged not to work as co-located members AT ALL. This would give EVERY member the opportunity to experience this exercise as if they were all individual remote members of the team. I feel the learning experience would be enhanced and more focused on the remoteness and the need to communicate and organise effectively.

There could be some mark allocation for effective communication since this appears to be a major factor in the exercise.

Second Additional DCLA: George Student

Soft Skills Write-Up

Was It a Success?
The project had its ups and downs, the communication between the members was very poor and no notes were compared and no links were exchanged. I was the only person that provided the other members with some way to help them find information on their value chain link but they never got back to me to say if the information I gave them was helpful or not. The good thing was that ***** appointed himself as a leader and kept constant communication with the members of the team. I don’t know how often he received feedback from the member in the PE campus but at least I and he were always communicating. The links on our value chain were not very well researched we used the first link that was suggested and that was it. The second net meeting that was organized by the lectures was a waste of time for me because only me and Marcus were there, at first he told me about the frustrations he had on finding information on his links then, I suggested him sum links and that was it, we ended up chatting about things that had nothing to do with our project, there was no other member of the group there to give any input on his part of the project.

It was incredibly difficult to find information about my link, and I thought I had the easiest link on our value chain, I only searched the internet and the information I found was very limited. I was fortunate enough to have a friend that is studying Nature Conservation and he helped me with my
link, otherwise I don’t know what I would have done. Even though the communication between the members was poor and it was difficult to find information at least on my link, I think that in the end everyone handed in their links to *****. I think that the value chain was a success mostly due to the leader constantly contacting us to find out how far we were with our links.

The Leader
I thought that ***** was a very good leader. He monitored the progress of the team very well, he also set a deadline and informed the team what to do, for example he sent an e-mail to the team members to remind them to add their references to their links and he told us which methods of referencing we should use.

The Team Members
As I previously mentioned there was very little communication between the team members, so there is no way for us to start to build a trusting relationship with each other. The only conversation I had was with Marcus and the 15 minutes we chatted was good enough for me to start trusting him a little bit, he seems to be a nice guy, unfortunately I cannot say anything about the other members.

What Did I Learn?
The main thing that I learned by doing this project was that a Virtual Team without a leader is a failure, some groups only chose a leader at the end of the project and they struggled. The other thing that I learned was that a team has to be familiar with every way of communication, for example the first net meeting session was a disaster because it was the first time some of the guys in PE ever used netmeeting and it was exciting for them and they were just messing around.

Suggestions
I have a few suggestions the first one is to encourage the team member to contact each other at least every second day to see how much progress we have and if we had nothing to show just communicate to the person that you have nothing. I think the lecturers should enforce that and deduct marks from the member of the team if he does not contact his team member within two days.

The second suggestion is to make the team e-mail their value chain to the lecturer on the first week of the project. Our value chain was only finalized on the second week of the project and we only had the third week to go and do our research, if the value chain has to be handed in for marks or not to receive a penalty the team will be more motivated to do their value chain.

The third is that the name of the leader should also be handed in on the first week together with the links of the value chain our leader was also only decided at the end of the second week and he only became a leader because he appointed himself.

The fourth is that the lectures demand that the students check their e-mail every day and not only on the days that we are supposed to send the e-mails to each other as suggested above.

The length of the project was perfect three weeks was more that enough for us to do what we had to do of course the project was rushed at the end because of a lack of time management by the team but I’m sure most teams had the same problem.

Overall this years project for me was a pleasant experience, I did this project in 2003 and it was a disaster, I think that because my team members did their worked and communicated with the leader the project actually went somewhere and we were able to hand in every link of our value chain.
### Addendum B

#### Quantitative Questionnaire

**Results**

(The values indicate the frequency the different levels were selected by the 43 students who filled in the questionnaire)

<table>
<thead>
<tr>
<th></th>
<th>Do not agree</th>
<th>Agree to some extent</th>
<th>Agree 50%</th>
<th>Agree to a large extent</th>
<th>I fully agree</th>
<th>I cannot comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The project was a success</td>
<td>0</td>
<td>5</td>
<td>4</td>
<td>23</td>
<td>11</td>
</tr>
<tr>
<td>2</td>
<td>I enjoyed doing the project</td>
<td>0</td>
<td>6</td>
<td>8</td>
<td>21</td>
<td>8</td>
</tr>
<tr>
<td>3</td>
<td>The project was an efficient way to learn about value chains</td>
<td>0</td>
<td>3</td>
<td>8</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>4</td>
<td>The project was an efficient way to learn about virtual teams</td>
<td>0</td>
<td>2</td>
<td>7</td>
<td>13</td>
<td>21</td>
</tr>
<tr>
<td>5</td>
<td>I knew how to search efficiently for information on a topic before this project</td>
<td>0</td>
<td>5</td>
<td>8</td>
<td>12</td>
<td>17</td>
</tr>
<tr>
<td>6</td>
<td>I learned how to search for information about an E-Commerce related topic</td>
<td>7</td>
<td>8</td>
<td>10</td>
<td>12</td>
<td>5</td>
</tr>
<tr>
<td>7</td>
<td>With the help of some research, I feel I will be able to identify the links in an industry value chain for a given product</td>
<td>1</td>
<td>1</td>
<td>6</td>
<td>25</td>
<td>10</td>
</tr>
<tr>
<td>8</td>
<td>With the help of some research, I feel I will be able to describe the business unit value chain for a link in the industry value chain for a product</td>
<td>0</td>
<td>3</td>
<td>14</td>
<td>17</td>
<td>9</td>
</tr>
<tr>
<td>9</td>
<td>This project has given me experience in ways to communicate effectively in virtual teams</td>
<td>0</td>
<td>5</td>
<td>12</td>
<td>15</td>
<td>11</td>
</tr>
<tr>
<td>10</td>
<td>This project has given me experience in ways to share information in virtual teams</td>
<td>1</td>
<td>6</td>
<td>8</td>
<td>15</td>
<td>13</td>
</tr>
<tr>
<td>11</td>
<td>This project has given me experience in ways to build trust with team members that I do not know</td>
<td>1</td>
<td>7</td>
<td>16</td>
<td>14</td>
<td>4</td>
</tr>
<tr>
<td>12</td>
<td>I have more confidence now to participate in a virtual team in future</td>
<td>0</td>
<td>4</td>
<td>10</td>
<td>16</td>
<td>13</td>
</tr>
<tr>
<td>13</td>
<td>The experience I have gained will enable me to be a more productive team member in a virtual team in future</td>
<td>0</td>
<td>1</td>
<td>7</td>
<td>19</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Do not agree</td>
<td>Agree to some extent</td>
<td>Agree 50%</td>
<td>Agree to a large extent</td>
<td>I fully agree</td>
<td>I cannot comment</td>
</tr>
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<td>---</td>
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</tr>
<tr>
<td>14</td>
<td>I would not mind doing a project with the same team members again</td>
<td>1</td>
<td>4</td>
<td>9</td>
<td>14</td>
<td>15</td>
</tr>
<tr>
<td>15</td>
<td>The knowledge I gained about virtual teams has opened my eyes to ways to avoid problems in future co-located projects as well</td>
<td>0</td>
<td>5</td>
<td>9</td>
<td>16</td>
<td>13</td>
</tr>
<tr>
<td>16</td>
<td>Most of the problems we experienced were not due to the team being virtual, but were typical of any group projects</td>
<td>3</td>
<td>6</td>
<td>10</td>
<td>17</td>
<td>4</td>
</tr>
<tr>
<td>17</td>
<td>The fact that the PE lecturer was not available during some sections of the assignment caused the project to be less successful</td>
<td>9</td>
<td>6</td>
<td>12</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>18</td>
<td>The assignment document handed out to us gave me a clear description of what was expected of me</td>
<td>2</td>
<td>7</td>
<td>9</td>
<td>9</td>
<td>16</td>
</tr>
<tr>
<td>19</td>
<td>Knowing what is expected of me increased my motivation to do the assignment</td>
<td>2</td>
<td>5</td>
<td>6</td>
<td>14</td>
<td>16</td>
</tr>
<tr>
<td>20</td>
<td>The documentation handed out to us was too much to read</td>
<td>21</td>
<td>7</td>
<td>4</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>21</td>
<td>The initial lecture on virtual teams given just before the project prepared me adequately for the project</td>
<td>1</td>
<td>14</td>
<td>17</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>22</td>
<td>The marking rubrics were helpful in that I knew what was important and what I had to concentrate on</td>
<td>3</td>
<td>3</td>
<td>7</td>
<td>13</td>
<td>15</td>
</tr>
<tr>
<td>23</td>
<td>I would prefer to receive marking rubrics for co-located group assignments as well as individual assignments in future</td>
<td>4</td>
<td>2</td>
<td>7</td>
<td>18</td>
<td>10</td>
</tr>
<tr>
<td>24</td>
<td>The rubrics covered all the point I feel are important to be assessed on</td>
<td>1</td>
<td>5</td>
<td>8</td>
<td>15</td>
<td>14</td>
</tr>
<tr>
<td>25</td>
<td>Having a team leader is crucial to the success of the project</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>5</td>
<td>33</td>
</tr>
<tr>
<td>26</td>
<td>It is more important to have a team leader in a virtual team than in a co-located team</td>
<td>4</td>
<td>5</td>
<td>4</td>
<td>12</td>
<td>16</td>
</tr>
<tr>
<td>27</td>
<td>It was more difficult to resolve conflict in the virtual team than in co-located teams</td>
<td>5</td>
<td>4</td>
<td>5</td>
<td>15</td>
<td>8</td>
</tr>
<tr>
<td>28</td>
<td>It was more difficult to make decisions in the virtual team than in co-located teams</td>
<td>2</td>
<td>4</td>
<td>13</td>
<td>20</td>
<td>4</td>
</tr>
<tr>
<td>29</td>
<td>Team members seem to be more agreeable in the virtual team than in a co-located team</td>
<td>4</td>
<td>3</td>
<td>15</td>
<td>15</td>
<td>6</td>
</tr>
<tr>
<td>30</td>
<td>I was more inclined to work and not let my team down in the virtual team than in a co-located team</td>
<td>5</td>
<td>4</td>
<td>7</td>
<td>17</td>
<td>9</td>
</tr>
</tbody>
</table>
### 31. It was more difficult to plan who does what in the virtual team than a co-located team

<table>
<thead>
<tr>
<th>Do not agree</th>
<th>Agree to some extent</th>
<th>Agree 50%</th>
<th>Agree to a large extent</th>
<th>I fully agree</th>
<th>I cannot comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>6</td>
<td>11</td>
<td>12</td>
<td>6</td>
<td>0</td>
</tr>
</tbody>
</table>

### 32. Not being able to read someone’s body language makes it more difficult to assign work to them

<table>
<thead>
<tr>
<th>Do not agree</th>
<th>Agree to some extent</th>
<th>Agree 50%</th>
<th>Agree to a large extent</th>
<th>I fully agree</th>
<th>I cannot comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>8</td>
<td>7</td>
<td>10</td>
<td>14</td>
<td>3</td>
</tr>
</tbody>
</table>

### 33. The value chain should be handed in on an earlier date before the other sections are done

<table>
<thead>
<tr>
<th>Do not agree</th>
<th>Agree to some extent</th>
<th>Agree 50%</th>
<th>Agree to a large extent</th>
<th>I fully agree</th>
<th>I cannot comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>6</td>
<td>11</td>
<td>9</td>
<td>5</td>
<td>8</td>
</tr>
</tbody>
</table>

### 34. Buddy rating is less effective in a virtual team than in a co-located team

<table>
<thead>
<tr>
<th>Do not agree</th>
<th>Agree to some extent</th>
<th>Agree 50%</th>
<th>Agree to a large extent</th>
<th>I fully agree</th>
<th>I cannot comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>10</td>
<td>6</td>
<td>9</td>
<td>7</td>
<td>3</td>
</tr>
</tbody>
</table>

### 35. It is more difficult to ensure quality from team members in a virtual team than in a co-located team

<table>
<thead>
<tr>
<th>Do not agree</th>
<th>Agree to some extent</th>
<th>Agree 50%</th>
<th>Agree to a large extent</th>
<th>I fully agree</th>
<th>I cannot comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>6</td>
<td>8</td>
<td>12</td>
<td>9</td>
<td>2</td>
</tr>
</tbody>
</table>

### 36. The members on the different campuses had the same concept of quality

<table>
<thead>
<tr>
<th>Do not agree</th>
<th>Agree to some extent</th>
<th>Agree 50%</th>
<th>Agree to a large extent</th>
<th>I fully agree</th>
<th>I cannot comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>7</td>
<td>12</td>
<td>14</td>
<td>4</td>
<td>1</td>
</tr>
</tbody>
</table>

### 37. The fact that the PE campus has more students than the George campus affects the effectiveness of the project by allowing most of the students to meet face-to-face

<table>
<thead>
<tr>
<th>Do not agree</th>
<th>Agree to some extent</th>
<th>Agree 50%</th>
<th>Agree to a large extent</th>
<th>I fully agree</th>
<th>I cannot comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>4</td>
<td>8</td>
<td>13</td>
<td>6</td>
<td>4</td>
</tr>
</tbody>
</table>

### 38. More of our team’s communication was done face-to-face with students from my own campus than with the students from the other campus

<table>
<thead>
<tr>
<th>Do not agree</th>
<th>Agree to some extent</th>
<th>Agree 50%</th>
<th>Agree to a large extent</th>
<th>I fully agree</th>
<th>I cannot comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>5</td>
<td>12</td>
<td>7</td>
<td>7</td>
<td>0</td>
</tr>
</tbody>
</table>

### 39. I find it difficult to start communicating with people I do not know in my own class

<table>
<thead>
<tr>
<th>Do not agree</th>
<th>Agree to some extent</th>
<th>Agree 50%</th>
<th>Agree to a large extent</th>
<th>I fully agree</th>
<th>I cannot comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td>7</td>
<td>9</td>
<td>5</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

### 40. I find it difficult to start communicating with people I do not know on the other campus

<table>
<thead>
<tr>
<th>Do not agree</th>
<th>Agree to some extent</th>
<th>Agree 50%</th>
<th>Agree to a large extent</th>
<th>I fully agree</th>
<th>I cannot comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>8</td>
<td>9</td>
<td>5</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

### 41. Everybody managed to introduce themselves properly in the beginning

<table>
<thead>
<tr>
<th>Do not agree</th>
<th>Agree to some extent</th>
<th>Agree 50%</th>
<th>Agree to a large extent</th>
<th>I fully agree</th>
<th>I cannot comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>5</td>
<td>7</td>
<td>14</td>
<td>13</td>
<td>1</td>
</tr>
</tbody>
</table>

### 42. It is important for the success of the project to get to know the members on the other campus – some personal information, photos, etc.

<table>
<thead>
<tr>
<th>Do not agree</th>
<th>Agree to some extent</th>
<th>Agree 50%</th>
<th>Agree to a large extent</th>
<th>I fully agree</th>
<th>I cannot comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>6</td>
<td>8</td>
<td>12</td>
<td>11</td>
<td>0</td>
</tr>
</tbody>
</table>

### 43. Having acknowledgement rules for email is crucial

<table>
<thead>
<tr>
<th>Do not agree</th>
<th>Agree to some extent</th>
<th>Agree 50%</th>
<th>Agree to a large extent</th>
<th>I fully agree</th>
<th>I cannot comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>2</td>
<td>10</td>
<td>10</td>
<td>19</td>
<td>0</td>
</tr>
</tbody>
</table>

### 44. Prioritising emails is crucial

<table>
<thead>
<tr>
<th>Do not agree</th>
<th>Agree to some extent</th>
<th>Agree 50%</th>
<th>Agree to a large extent</th>
<th>I fully agree</th>
<th>I cannot comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>7</td>
<td>6</td>
<td>9</td>
<td>19</td>
<td>1</td>
</tr>
</tbody>
</table>

### 45. Having a record of our communication enabled me to revisit what was said, giving me a better understanding of what was going on

<table>
<thead>
<tr>
<th>Do not agree</th>
<th>Agree to some extent</th>
<th>Agree 50%</th>
<th>Agree to a large extent</th>
<th>I fully agree</th>
<th>I cannot comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>6</td>
<td>13</td>
<td>17</td>
<td>5</td>
</tr>
</tbody>
</table>

### 46. I found that my emails were misinterpreted

<table>
<thead>
<tr>
<th>Do not agree</th>
<th>Agree to some extent</th>
<th>Agree 50%</th>
<th>Agree to a large extent</th>
<th>I fully agree</th>
<th>I cannot comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>8</td>
<td>6</td>
<td>5</td>
<td>21</td>
<td>3</td>
</tr>
</tbody>
</table>

### 47. I found it difficult to phrase my emails accurately avoiding possible interpretations

<table>
<thead>
<tr>
<th>Do not agree</th>
<th>Agree to some extent</th>
<th>Agree 50%</th>
<th>Agree to a large extent</th>
<th>I fully agree</th>
<th>I cannot comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td>5</td>
<td>7</td>
<td>6</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>
I tended to misinterpret emails sent to me by my team mates

I tended to misinterpret emails sent to me by my team mates

I stereotyped people according to the way they portrayed themselves in their emails

I stereotyped people according to the way they portrayed themselves in their emails

Delays in email communication has a positive effect in that it gives me time to think about what was said and my response

Delays in email communication has a positive effect in that it gives me time to think about what was said and my response

Delays in email communication has a negative effect in that I would not get an immediate answer when I needed it, but only later when I was busy with something else

Delays in email communication has a negative effect in that I would not get an immediate answer when I needed it, but only later when I was busy with something else

There should be more NetMeeting sessions

There should be more NetMeeting sessions

I feel the meetings we had using NetMeeting were more productive than co-located meetings in that less time was wasted chatting about other things

I feel the meetings we had using NetMeeting were more productive than co-located meetings in that less time was wasted chatting about other things

I feel the meetings we had using NetMeeting were less productive than co-located meetings in that everything had to be typed which was more time consuming

I feel the meetings we had using NetMeeting were less productive than co-located meetings in that everything had to be typed which was more time consuming

The enthusiasm of my team members made me enthusiastic as well.

The enthusiasm of my team members made me enthusiastic as well.

I will keep contact with my team members from the other campus in future

I will keep contact with my team members from the other campus in future

The life skills section of the assignment should be added to co-located projects as well

The life skills section of the assignment should be added to co-located projects as well

The combined project is worthwhile and must be repeated in future

The combined project is worthwhile and must be repeated in future

Open Questions:

59. What motivated you to do /not do the assignment?

60. What were the factors contributing to the success/failure of the projects?

61. What are the characteristics of a good team leader for virtual teams?

62. What difficulties did you have in choosing your team leader? How did you choose your team leader? Did this result in the best person being chosen in your case?

63. Comment about the length of the project, the difficulty and the time frame.

64. Comment about the notes handed out to you on the assignment and the background information.

65. Comment about the way information was shared in your group. was it efficient and effective?

66. How did you go about making decisions in the project?
Addendum C

Examples of Emails

Emails in second additional cycle explaining reason why support person was not able to help with the NetMeeting session: Discussion was unfortunately in Afrikaans)

Support person
Sent: 15 March 2004 02:19 PM
To: van Niekerk Joke

Sjoe, ek moes vir ***n kry om te help, ek moes my groot screen skuif en het in die proses ‘n spier heeltemal geskeur, so erg date ek vir xrays moes gaan!!!! En natuurlik gebeur dit net voor die prac begin!!!!!

Maar dit het darem goet verloop lyk dit vir my...........

-----Original Message-----
From: van Niekerk Joke
Sent: 2004/15/03 02:11 PM
To:*****
Subject: NetMeeting

Hallo*****

Baie dankie vir jou moeite met die NetMeeting. Ek het ‘n bietjie ge"panic" in die begin, maar alles het verbasend goed afgeloop. Ons gaan weer so ‘n sessie moet doen op Maandag 29 Maart. **** het seker al vir jou gesê.

Dankie
Groete
Joke

Emails in second additional cycle confirming arrangements with PE Lecturer

PE Lecturer
Sent: 01 March 2004 12:11 PM
To: van Niekerk Joke

Hi Joke,

The training hasn't been what it should be but I'm sure that's normal for most cyclists no matter how professional or un-professional they may be.

Please confirm whether you will be able to discuss the Virtual Project with them on Friday, 12th March from 09h40 to 10h55 in N1 so that I can inform them accordingly.
Attached please find my class list ...

Hope to hear confirmation from you soon.

Thanks,
*****
-----Original Message-----
From: van Niekerk Joke
Sent: Friday, February 27, 2004 6:09 PM
To: PE Lecturer
Subject: Combined project

Hi ****

How is your Argus training going?

Could you please send me a class list so that I can set up the groups. I hope to finish with Cisco this weekend so that I can spend all my spare time on the project.

Enjoy your training!

Regards
Yoke

Correspondence between a PE student and me

-----Original Message-----
From: PE student
Sent: 30 Maart 2004 10:49
To: van Niekerk Yoke
Subject: Re-mail!

I have not yet received a response to the mail that I sent earlier today and realise that I did not request a receipt so am unaware that you received it at all!! (A skill now learned - responsible value chain members should ALWAYS request a receipt.)

This is a repeat of the two messages that I sent to you earlier today.

Could you give me some idea of what the test will entail. Are there going to be long questions and if so of what mark value would they be? What will the total question mark be?

How would you like us to set out the write-up of skills learned? Should there be different sections for skills learned, advantages and difficulties or can they be integrated into one unit?

van Niekerk Yoke
Sent: 31 March 2004 10:34 AM
To: PE Student
Hi ****

Yes, you are right about the receipt. On the other hand, you did also not know that I only had time to look at the e-mails late yesterday and I still had to think about the answer before responding. Another issue in this type of communication!

It does not matter how you set out the skills, as long as it is readable and has some type of reason for the layout. I.e. you could have a problem and the solution/recommendation together, etc. or it could be split into sections. What you want to write, I think, would largely determine this.

The test is a more difficult issue. I have not had much time to think about it yet (another issue you would have been able to observe as well had we been collocated!) The main purpose of the test is to try and determine how much each person has learned from the experience. I have to make the time-period for the test short as you still have a lot to do in E-Commerce and I cannot take up more of the course’s time. Ideally it would have to be multiple choice, but I have not tried to set it up to see what the problems with that will be. I have to think about it over the holiday.

Please remind me early next term if I haven’t come back to you, and I will be able to tell you what it will be.

Regards
Yoke
Document emailed to all the lecturers by one of the participating lecturers after the third pre-research cycle (SKAR refers to the IESP system):

Suggestions for the use of SKAR and Possible solutions to problems experienced using SKAR

- Projects need to be started earlier in the year - (i.e. the beginning of the 2nd term).
- Project dates need to be set earlier in the year - (i.e. towards the end of the 1st term) - it is important that these dates be realistic and valid from the start (e.g. not fall on public holidays or weekends). The students need to know that these dates are absolute deadlines and that they will be adhered to.
- Students need to be assigned specific user ids! (At present, students who forget their user ids or passwords just log onto the system again using a different/new user id. They then cannot understand why nobody mails them back, but their mail has been sent to their previous user id, which they are no longer using.)
- Choosing group co-ordinators for each group when making up the groups needs to be considered. Some groups still do not have a co-ordinator - all group members wait for one of the other group members to volunteer.
- All students should know who all group members are, from the very beginning. (Each campus should have a list of the groups and their members up on notice boards - this list must be updated as lecturers inform each other of students not continuing their studies and if groups are assigned new members - for example when Saasveld joined)
- There needs to be one person in charge of the SKAR project.
- Lecturers need to have a training session on (a) the use of SKAR and (b) the principles behind its use.
- All the lecturers need to know why they are using Internet to do this project - not just why they need to make use of collaborative learning. (In order to sell the idea to the students the idea needs to be sold to the lecturers first).
- It may also be a good idea for the group composition to reflect a good academic mix (this would cater for students who leave after the 1st term - i.e. any one group would not lose more than one or two members). Each lecturer could supply a list of his or her students in academic sequence, before groups are made up.
down then use groupwise, if groupwise is down then a physical hand-in to the lecturer?

I think that it will go much more smoothly next year.
Addendum D

Peer Assessment and Test

Two examples of Peer Assessment in the First Additional Cycle

Value Chains Combined Project

PE Technikon
Information Technology
PE and George Campuses
E-Commerce Combined Project 1 2003
Value Chains and Soft Skills

Buddy Rating

Student Number: 
Student Name: 
Industry value chain: 
Team Leader: 
Home Language: 
Industry work Experience: 

Buddy rating: Assume you have 100 marks to distribute between the team members in your group. Distribute the 100 marks amongst your team members according to what you believe their contribution was towards the project. These weights will be used in distributing the final marks received for the value chain combined section amongst the team members.

<table>
<thead>
<tr>
<th>Member's name</th>
<th>Mark allocation</th>
<th>Reason (Optional)</th>
</tr>
</thead>
<tbody>
<tr>
<td>****</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>****</td>
<td>20</td>
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<td></td>
</tr>
<tr>
<td>****</td>
<td>20</td>
<td></td>
</tr>
</tbody>
</table>

Reason: Everyone put in the efforts
Buddy Rating

Student Number: *****

Student Name: *****

Industry value chain: TRAINING

Team Leader: *****

Home Language: XHOSA

Industry work Experience: 

Buddy rating: Assume you have a 100 marks to distribute between the team members in your group. Distribute the 100 marks amongst your team members according to what you believe their contribution was towards the project. These weights will be used in distributing the final marks received for the value chain combined section amongst the team members.

<table>
<thead>
<tr>
<th>Member's name</th>
<th>Mark allocation</th>
<th>Reason (Optional)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>*****</td>
<td>25</td>
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<td>*****</td>
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<td>20</td>
<td></td>
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<tr>
<td>*****</td>
<td>20</td>
<td></td>
</tr>
</tbody>
</table>
Example of Peer Assessment in the Second Additional Cycle

Value Chains – Buddy Rating Rubric
To Rate
Each Team Member

Group Name__________________________

Member Doing Assessment______**********(Team Leader)

Lecturer signature______________________________

Result______________________________

Team leader did most of the communications: Yes

NB: If the leader did most of the communications it might be difficult to rate the other team members on some of the criteria. Indicate clearly by ticking the “Cannot comment due to lack of information” box.

Give a short description of the duties of the team leader in your group
We started off by meeting in the prac class and discussing cement briefly and deciding who would be the team leader – I was chosen. I started off by asking all the group members to create a individual value chains for the cement and email them to me. I then compared them all and came up with a final value chain, which was emailed to all the members. I choose which member did which part in the value chain and requested the members to email me their research on their particular value chain. Once I received all the research I designed the website.

Did your group set up a shared area – folder/website – to share information? What method was used?
We attempted to use the share drive, but the George campus students could not access it. We communicated regularly using emails with attachments and didn’t find the need for the shared drive. We also found that using a shared drive would be a security problem for our research and ideas.
Did your team lay down email acknowledgement rules? Which ones?
We did not set down specific acknowledgement rules. I requested that the members reply that they have received email from me, when it was an important email. We did not have any problems in this regard.

Did your team prioritise email? How?
Yes, specifically when it came to when the research had to be in, and when the individual value chains had to be handed in, I made use of priority.

Member Being Assessed ***** ______________________________ (your “buddy’s name)

One of these rubrics must be filled in for each member in your team.

Draw a clear cross in the cell you agree most with in each criterion.

<table>
<thead>
<tr>
<th>Group participation</th>
<th>Assessed by peers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Excellent (marks=3)</td>
</tr>
<tr>
<td>... participated and did a fair share of the work</td>
<td>X</td>
</tr>
<tr>
<td>... participated in discussions and contributed towards decision making</td>
<td>X</td>
</tr>
<tr>
<td>... contributed towards research for value chains. The information was well researched and relevant</td>
<td>X</td>
</tr>
<tr>
<td>... completed assigned work on time</td>
<td>X</td>
</tr>
<tr>
<td>Member..</td>
<td>Group participation</td>
</tr>
<tr>
<td>----------</td>
<td>---------------------</td>
</tr>
<tr>
<td>...communicated often and timely</td>
<td></td>
</tr>
<tr>
<td>...always acknowledged communication received</td>
<td>X</td>
</tr>
<tr>
<td>...always prioritised communication</td>
<td>X</td>
</tr>
<tr>
<td>...communication was always clear</td>
<td>X</td>
</tr>
<tr>
<td>... kept group informed of progress at all times</td>
<td></td>
</tr>
<tr>
<td>... was reliable, always acted promptly on received communication</td>
<td>X</td>
</tr>
<tr>
<td>... always had an encouraging attitude and motivated team members</td>
<td></td>
</tr>
<tr>
<td>...encouraged other members to share ideas, listened to them and gave constructive feedback. Also accepted feedback from other members</td>
<td></td>
</tr>
<tr>
<td>...contributed actively in helping group to work together and complete the project successfully</td>
<td></td>
</tr>
<tr>
<td>... was a catalyst. He/she initiated actions in the group and kept the momentum going.</td>
<td></td>
</tr>
<tr>
<td>...was honest with the group on his/her strong/week points and preparedness to work</td>
<td>X</td>
</tr>
<tr>
<td>... was a conflict handler, solving group conflict when it arose</td>
<td></td>
</tr>
<tr>
<td>... made a good leader (only for group leader)</td>
<td></td>
</tr>
</tbody>
</table>

Additional assessment rubrics were similar and not copied here.
Test Second Additional Cycle:

**Question 1 (Value Chain)**

Give the main links in the value chain for **one** of the following

- Fried fish
- Metal spoon
- Castrol engine oil

**Question 2 (Virtual Teams)**

Scenario: (The questions do not have specific right or wrong answers. You will receive marks for the motivations you give for your answers)

Assume you are a software development project manager of a smallish software development firm in Port Elizabeth. In the past the firm has only had small projects, but a year ago the firm was given a million Rand project and you were made the project manager. The final date for the project is in a year’s time and it is crucial that the project is finished on time. Your firm does not have all the necessary expertise in-house, so it has been decided to get help from outside. You found experts Paul in George and Rosemary in East London.

a) Paul and Rosemary are used to working in a virtual team environment, but your own team members are not. **Will you** : (choose one of the following two options and motivate) **(6)**

Employ Paul and Rosemary and train your own people to work in virtual teams? or

Rather take two local people with far less experience and hope that they will be able to handle the job. You realise they will take much longer to do the job and will need technical training.

b) Due to lack of office space you have also employed 10 people from Port Elizabeth who will be working on the project from their own homes. **(6)**

Susan, a seasoned and well respected in-house team member, and Mary (one of the team members working from home), rushed into your office this morning, both furious. Mary has done a months worth of work and when she came in this morning to discuss it with Susan, Susan told her that it was wrong and that she will have to redo it. Mary’s side of the story is that Susan told her to do exactly what she has done. Unfortunately this was done verbally and there is no proof.

What will you do to prevent this situation from recurring? (Give 3 possible
c) Same situation as in b, but in this case the specifications changed and Susan emailed the changes immediately to Mary to inform her. Mary claims that she never received the emails. (4)

What went wrong and how can you prevent this from recurring? (Explain, give 2 possible solutions and motivate)

d) Takalani has been working for the firm for many years. He knows what procedures to follow, who to contact, where to find information and the general operation of the firm.

He came to you this morning complaining that he keeps on getting phone calls from the 10 people working from home enquiring about all kinds of things. It has reached the state where it is taking so much of his time that he is not able to make any progress on the work he is scheduled to do for the project.

How can you solve this problem? (Give 3 options and motivate) (6)
# Addendum E

## DCLA Perceived Cost and Reward Theory Data Incidents

Table with data illustrations from the literature and the six DCLAs executed at the PETech for the PCR theory developed in Chapter 7.

<table>
<thead>
<tr>
<th>PCR Theory Concepts</th>
<th>Incidents</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>7.2 Perceived costs and rewards</strong></td>
<td></td>
</tr>
</tbody>
</table>
| Costs | “…the amount of work this entailed for the lecturer was very much more than had been during the first cycle. This put a lot of pressure on the lecturer.” Thomas and Brown (2001) on the second pre-research cycle.  
“We have endless complaints from students because their groups are not functioning and they are going to lose marks.” (Email from me to the other lecturers, April 17, 2000).  
Students feeling it is a waste of time and effort, time consuming, misuse of time, more testing than anticipated, not interesting, a failure, not enjoyable, a negative experience, boring topics, and instigated a negative attitude towards virtual teaming (see sections 5.10 and 6.11).  
“The project wasted a lot of study time and also put a lot of unnecessary stress on the students” and “It may also have discouraged some students of ever wanting to do distance collaboration or be part of a virtual team” (CS2G1-4). |
| Rewards | The rewards included marks, interesting and stimulating, had educational value, valuable learning experience, preparation for the real world, a valuable experience for the third year project, rewarding, enjoyable, fun, pleasant, challenging, satisfactory, and exciting (see section 3.5.9, 5.10, 6.2, 6.11 & survey).  
“I want you to have some fun, and be proud of the final product.” (Email from Brown to students in third pre-research cycle, Aug 23, 1999).  
“forced us to think outside our normal scope of thinking”(CS2PE1-2).  
“I learnt and put into practice some life skills” (CS2G1-5).  
“keen to meet new people in my class” (CS2PE10-45). |
| Perceived | “I would like to query why I only got 25% for my individual mark for the group project…I don’t mean to sound bitter, but I don’t think that the effort I put in was only worth 25%” (email from student CS2PE1-2 to me May 26, 2004 after receiving a low mark for an incorrect deliverable).His perception of the quality of his work was different to my perception of the quality.  
Perceived cost of time is higher when a student has a test to study for than when there are no other commitments. |
| Margin | “It expected an ENORMOUS amount of time of the lecturers involved and it was not worth it for what was obtained out of it” words of lecturer in pre-research (Thomas and Brown, 2001).  
“…it will make it more interesting and the members will also be more...” |
**Properties of PCR**

<table>
<thead>
<tr>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Numerous</strong></td>
<td>See above under Costs and Rewards for a subsection of the possible costs and rewards. See discussion in Sections 3.2 &amp; 3.3.</td>
</tr>
<tr>
<td><strong>Costs and reward factors are Interlinked</strong></td>
<td>Uncertainty increases the need for communication. It cannot be cleared quickly in a distributed environment wasting time and causing stress (see section 3.5.3) – linking uncertainty, time and stress. Students felt a high mark weighting was unfair because they did not have much control over the execution of the task, but if the weighting was low students felt it was not worthwhile to participate because the DCLAs require a lot of time and effort (see section 3.5.8) – linking marks rewards and time costs. “I found this aspect of pressure made me a better worker” (CS2PE10-45) linking cost of pressure with reward of better working (reduced time, better deliverable).</td>
</tr>
<tr>
<td><strong>Costs and rewards are not well defined, known, nor consciously identified</strong></td>
<td>“Team started of being very enthusiastic…inevitable that this will change throughout the duration of any project. The reason being that at the beginning no one has any assumptions of their group members.” (CS2PW1-3). Students only realising a year after the DCLA that their relationship building had long term value (see section 6.12).</td>
</tr>
<tr>
<td><strong>Cost and reward factors highly individual</strong></td>
<td>“If someone can ask me now the starting point of working in distributed team project (sic) I would say first of all know your members” comment by CS2PE8-37, versus only 53% of the students in the survey agreeing that it was important for the success of the assignment. 70% of the students feeling that knowing what is expected of them increases their motivation to do the assignment, compared to 17% who disagreed. “…not all other team members situated in Port Elizabeth shared the same enthusiasm as we did” (CS1G1-2).</td>
</tr>
<tr>
<td><strong>Value attached to each cost and reward factor is individual</strong></td>
<td>Five students in the second additional cycle who felt the DCLA was not successful were from four different teams. Their fellow team members rated it as successful (survey and see section 6.11). The value of time differed from student to student and over time, depending on external demands on the same time (see section 5.3). Only nine of the students felt that marks was their main motivator to participate in the DCLA (survey). “Group members work…under different stress tolerances” (CS2PE8-35).</td>
</tr>
<tr>
<td><strong>Not representable in one calculable unit</strong></td>
<td>For example, enjoyment, excitement and fun are not, as a rule, represented in terms of numbers. The value of enjoyment cannot be added to the value of marks.</td>
</tr>
<tr>
<td><strong>Uncertain and estimated values</strong></td>
<td>Students estimated the time needed from task properties such as the time frame and long assignment document. They got the impression “that it was an overwhelming task…(it is) not something we have the time to do considering the weight of the mark we receive” (CS1PE9-3). “…sounded like an interesting and fun project. But it soon became apparent that I had misjudged” (CS2G1-4). “The combined project that was handed to us …proved to be more troublesome for me than originally anticipated” (CS1G1-2).</td>
</tr>
</tbody>
</table>
### Interdependency

Students preferred high facilitation level by lecturers, but a high facilitation rate tended to reduce the virtual teaming experience and increase the lecturers’ costs (see section 3.5.7). Uncertainty increases the chances of making mistakes and wasting time, thereby, increasing frustration and reducing enjoyment (see discussion below - Uncertainty).

### False prominence

“In order to give adequate feedback and catch the students who are falling through the cracks the lecturer should keep close observation of each group” (Thomas & Brown, 2001). The need for high lecturer control was shown to be unnecessary in the second additional cycle when the lecturer involvement was minimal, but student participation rate was very high (see sections 6.10, 6.11, and 6.12). High mark weighting did not improve participation (see section 3.5.9 and survey).

### Strategies

#### Width of margin

In the second additional cycle the margin between possible costs and rewards was increased by reducing some of the costs. The margin seems to have been large enough to make it worthwhile for all, but one, students to participate (see section 6.12). “This year in my opinion seems to have found the balance very well” (CS2PE7-3).

#### Low stakes

At 10% of the course marks the stakes of not participating was relatively low for most of the students in the two additional cycles (see Chapter 5, 6).

#### High stakes

“The IESP project mark is worth 15% of their year mark. It is thus possible to fail a student on the basis of personal opinion” email from M2 lecturer motivating that all projects should be marked by Brown, April 18, 2000).

#### Increasing a small margin

“It was decided to shorten the duration of the project…This would also reduce the number of times the students had to report back on the project and thus reduce lecturer time” (Thomas & Brown, 2001).

“…do we tell them they are to loose (sic) marks? Go to the headmasters office? Explain to their friends why they are not participating???? What if they are on a different campus?” Part-time lecturer in the fourth cycle expressing her frustration at the request to “Once a week, check on who has not been participating” and how this was to be accomplished by increasing the students’ costs or reduce rewards (email May 5, 2000).

In the first additional cycle the PE students admitted in the debriefing session that they had decided to let the G students do the brunt of the work. This was also evidenced in the fact that the G students initiated and coordinated the assignment (see section 5.10).

#### Recalculation

Students recalculated and stopped participating when they perceived that the misinterpretation of the requirements at the two campuses would mean additional time needs (see section 5.8).

In the first additional DCLA with its longer time frame students working in fragmented time on the DCLA – often when a deadline was drawing near. The DCLA had to compete for time with other external demands with higher value which changed over time. Students also had to reenergize themselves for the task and retrace threads. For example, claiming “…lazy and tired of it…” (CS1PE12-43). This meant the perceived costs changed and students had to recalculate to decide on continued participation.
Awareness Students’ past experiences in co-located tasks caused concerns about non or low participation rates in other students (see section 3.5.9).

“I was involved in one in my first year ...Perhaps I assumed it was going to be like that again...” (CS1PE4-14).

In the briefing session at the start of the second additional cycle the students were made aware of some of the costs and rewards they could expect (see section 6.12)

7.3 Task-related PCR

Viable The viability of the DCLAs in terms of lecturer PCR is questionable due to the relative high recurring costs (see section 6.8 & 6.12).

Costs “...needs a lot of skill, determination and dedication” (CS2G1-4).

“...it was quite frustrating having to wait for someone to answer your emails...” (CS2PE12-55).

“...frustration he had on finding information on his links...” (CS2G4-19).

Rewards Knowledge and skills acquisition (see sections 3.5.1, 4.2, 5.2 and 6.2).

“I was very enthusiastic about working with someone who is not located in the same vicinity as me...” (CS2PE9-40).

“The teamwork (over a distance) was a nice way to give us a little glimpse of the real world” (CS2PE2-7)

Task characteristics Task requirements for DCLAs (see section 3.5.3).

Disparity between task aims and DCLA aims (see sections 3.5.1 and 5.8).

Difficult to balance the complexity of the task to require teamwork, but not be too complex to discourage participation (see section 3.5.3).

“Complexity of the subject matter” (CS1G1-2), “...not a simple task” (CS2PE1-4), “...collaborating over a distance is difficult” (CS2G4-1).

7.4 Individual-related PCR

Unique self “…had to use my past experience and general knowledge to...” (CS2G1-4).

“not everyone has the same standard of work...some of the links received were really well done, and others were not” (CS1PE8-32).

“I feel that even if you are extremely committed to the project at hand, and constantly e-mail your team members, this is not a guarantee that they will fulfill the work given to them. If they do not want to do the work, they won’t” (CS1G3-4).

“I am an extremely social person, and enjoy meeting new and interesting people, but when it comes to work; I tend to lack faith in the abilities of others, and so tend to prefer to work alone.” (CS2PE10-45)

Awareness of influence of self “I did not work hard on this project...I was involved in one in my first year...I was the weak link (so to speak)” (CS1PE4-14).

“...since all my members were working hard, I found myself motivated to also work harder because I did not want to disappoint our project.” (CS2PE8-37).

Other stakeholders changing a stakeholder’s awareness of PCR The negative sentiment of the pre-research was communicated to the rest of the class at PE. The G students had a different attitude towards the assignment (see section 5.5).

“Motivate other members that are not enthusiastic to see the bigger picture and help them to see that a project is not a punishment but a learning experience.” (CS1G1-2).

Debriefing session after additional first cycle was used to make the students more aware of what they had learned (see section 5.8).
Altruism

In several teams students helped each other with the individual links (see section 6.7).

"Of course each member had his/her own portion to do, but that did not mean that it was now his/her own problem alone." (CS2PE8-37).

### 7.5 Value of time

**Intrinsic value of time**

"I think the two main reasons for the lack of motivation was a) Mass (sic) amount of work given to us from other subjects as well as a bigger more important project with due dates in the same time and b) the feeling that it was a waste of time" (CS1G5-8).

"...the project wasted a lot of study time..." (CS2G1-4).

**Length of time frame**

Difficult to find an ideal time frame. Too long and students lose interest, too short and there is not enough time for distance communication (see section 3.5.3).

"The main problem here was that the times for the different sections of the project to be handed in was too far spaced...because we had a lot of other work" (CS1PE4-20). Comment on the longer time frame.

"I was not quite satisfied with the final web page, but had to compromise because of the lack of time" (CS2G1-4). Comment on the shorter time frame.

"...the project should be spread over a longer period of time...giving the members the ability to produce even better results, under less stress" (CS2G1-4).

**Lower valued time procrastination**

The intention of the longer time frame for the first additional cycle was that students could use lower valued time for the assignment. Unfortunately the work ethics of many of the students still resulted in last minute workers (see section 5.4).

"...as a student most things normally get done soon before the deadline" (CS1G12-44).

**Time management skills**

Late workers

"This project also taught me how to plan and manage my time effectively" (CS2PE10-43).

"Despite our good line of communication the team members in Port Elizabeth did not make a good enough effort to deliver their content to me timely...This put a great deal of pressure on me to ensure that the website was in fact completed on time" (CS2G8-38).

"Another problem I found was that by leaving all the work to the last minute, I actually added more pressure on myself as tests and practicals for my other subjects slowly started taking precedence over this assignment" (CS1PE8-33).

**Optimal use of time**

Conflicting opinions on use of time

"...it became clear to me that it was going to take some effort to get my fellow team members motivated to take part in the project. They seemed too excited initially with the fact that they could now talk about Star Wars between campuses" (CS2G4-20).

"I scanned one of our member’s discussion topics, I had to send it back to her...I was not prepared to have the whole groups marks reduced due to her laziness" (CS2PE12-56).

"...it is imperative for a project to nominate a team leader” (CS2PE1-1).

"The lack of communication and misinformation were the biggest problem encountered by me" (CS1G4-5).

**Difficulty to estimate time costs**

The time needed for the additional student deliverables in the pre-research was substantially more than originally estimated (see section 4.8).

"I also know that collaborating effectively takes longer than one might
### 7.6 Uncertainty

<table>
<thead>
<tr>
<th>Task, execution, quality standards, stakeholders, environment, changes over time, not all known at the beginning</th>
<th>Working over a distance with unknown members and having to rely on them for marks carries a high level of uncertainty (see section 3.5.7). Uncertainty increases the need for communication, can waste time and cause stress (see section 3.5.3). Assessment criteria are often ambiguous (see section 3.5.7). Individual students have little control over the deliverables (see section 3.5.7). “The project definition was not clear…” (CS1PE2-22). “…it was a battle to decide whose value chain to use and who’s understanding to incorporate” (CS1PE6-29).</th>
</tr>
</thead>
</table>

### 7.7 Expectations and assumptions

<table>
<thead>
<tr>
<th>Expectations/assumptions</th>
<th>“Do not expect everyone else to have the same degree of interest or commitment than you” (CS1G1-2). “And don’t assume the problem is very difficult just because you don’t know very much about it” (CS1G9-1). “…had I known from the beginning what was expected of us, my quality of work would have been better and I would have been more interested in making the project a success” (CS1PE13-18). “…followers will feel the pressure of meeting the expectations of their leaders” (CS2PE1-3). “The person on the receiving end of the message could make assumption (sic) on the sender’s attitude, which might not be intended” (CS2PE1-3).</th>
</tr>
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<tr>
<th>Awareness</th>
<th>Students were afraid that if lecturers knew there were teaming problems that they would lose marks. They were informed in the briefing session before the second additional cycle that they could expect that everything was not going to go smoothly, but that was part of the learning experience (see sections 3.5.6 and 6.4).</th>
</tr>
</thead>
</table>

| Short notice | When the Computer Support Person did not show at the first NetMeeting Session in the second additional DCLA quick plans had to be made not to lose the NetMeeting Session. The costs would have been high in the three week time period for the DCLA if the session was missed. The costs were already high in terms of students believing that the DCLAs
Realisation of expectations/assumptions

I assumed it was going to be like that again" CS1PE4-14 referring to the pre-research cycles. He admitted that it was not a good decision and that he “probably lost out on a nice experience". “…a lot more testing than what was anticipated” (CS2PE1-3). “When I started with the project, I had quite high expectations...But it soon became apparent that I had misjudged” (CS2G1-4).

Hope

“...the sessions were not as fruitful as one would have hoped” (CS2G1-4). No precautions were taken and the team had to correct this afterwards via the slower emails.

7.8 Fairness

One incurs costs another reaps rewards

“Sometimes a good student would do everything – or worse a student with poor HTML skills would end up doing the HTML and wreck the project for the group” pre-research (Thomas and Brown, 2001). Group mark assigned to all the members promoted freeriding and the sucker effect in the first pre-research cycle (see section 4.9).

Adversely affected by another stakeholder’s actions

“...some of the mentors really got involved in their groups and others forgot about their groups completely. This meant that some of the groups were helped more than others.” (Thomas and Brown, 2001) on second pre-research cycle.

Same rewards for similar task with lower costs or higher rewards for similar task with similar costs

“This will at least allow the student that does put an effort in to be recognised for it” (email sent by me to Brown in the fourth pre-research cycle making a suggestion on how the task needs to be split by the students, Mar 8, 2000). Inconsistent assessment by the different lecturers in the pre-research (see section 4.9). A student’s learning experience was highly dependent on his/her team and differed from team to team.

Deception

Some students plagiarised in the hope of getting marks for minimal work (see section 5.7).

High premium on fairness

More than one lecturer involved in the facilitation reduced the lecturer load, but increased inconsistency across schools which was one of the aspects most disliked by the students in the literature (see section 3.5.7). “Two student groups handed in similar quality work. One project was marked by ... and received a fail. The other project was marked by ... and was awarded a distinction. The students complained bitterly…the students will not tolerate inconsistencies in the evaluation of their projects due to ‘personal differences’ in the definition of style, etc.”, and “The IESP project mark is worth 15% of their year mark. It is thus possible to fail a student on the basis of personal opinion” (email from M2 lecturer motivating that all projects should be marked by Brown, April 18, 2000).

Strategies: convince, surrender, ignore, grudgingly continue, covert action, unlawful action

The individual component of the task in the second additional cycle was increased to allow for fairer marks to be assigned to the individual students (see section 6.9). This reduced the learning experience as it reduced the need for virtual teaming.

“I would like to query why I only got 25% for my individual mark for the group project…I don’t mean to sound bitter, but I don’t think that the effort I put in was only worth 25%” (email from student CS2PE1-2 to me 26 May, 2004 after receiving a low mark for an incorrect deliverable. After my explanation he accepted the low mark. I do not know whether he was
The more diligent students often take control of the DCLA in their group by fulfilling the leadership role, and by doing most of the work. In the first additional cycle some of the PE students covertly decided to let the George students do the brunt of the work as they felt the assignment was a George initiative and it was unfair to expect them to participate (see section 5.10).

**Devalued rewards**

After the pre-research cycles the DCLAs did not have a good reputation with a low value attached to their rewards. “I am not the biggest fan of these inter-campus combined projects. I was involved in one in my first year and no one communicated with each other, group leaders didn’t effectively co-ordinate the project and certain students found themselves carrying the whole group. Perhaps I assumed it was going to be like that again…” (CS1PE4-14). His attitude only changed after the briefing session.

### 7.9 Others

**Costs and rewards of teaming**

Larger teams tend to be less productive with more opportunities for hiding and free-riding (see section 3.5.6).

Difficult to set up ideal groups (see section 3.5.6).

Reluctance to report teaming problems as students were concerned that they would lose marks (see section 3.5.6).

Last minute workers forcing team leaders to work in high valued time to assemble final product (see section 6.4).

**Cost increases of teaming**

“…most of the students seem to have or have had a problem of some sorts with their groups” (document sent by S1 lecturer to other lecturers 1999).

Fear of online communication because students fear that they will look stupid (see section 3.5.6).

Stress when the assignment which they have little control over is linked to assessment (see section 3.5.6).

**Cost reduction of teaming**

“We supported each other, built good relationship (sic) amongst ourselves and worked towards achieving the goals set for the project” (CS2G1-5).

**Rewards increases/reductions**

Learning virtual teaming skills which was the aim of the DCLA (see 5.2, 6.2).

Only 26% feeling that they received a better grade than doing it alone (see section 3.5.6).

**Impact of self on others**

Not all members share the same work ethics frustrating the more diligent students (see section 3.5.6).

Students tend to ignore information sent by others and be tardy to share own information (see section 3.5.6).

Enthusiasm being contagious (see section 3.5.6).

“I don’t really know the team very well, and I don’t want them to think I am the cause of this group not achieving its goals and objectives” (CS2PE1-2).

“It is much easier to see the strengths and weaknesses of people in person” (CS2PE1-2).

**Positive member characteristics for teaming**

Positive member characteristics for teaming are listed in section 3.5.4.

High performers exchange many social interactions (see section 3.5.6).

“My students are not mature enough to handle working in a group without extra life skills classes…” lecturer comment in pre-research, and “(t)he project would probably have been very successful with MBA students”
Membership
In industry virtual teams members are chosen on specific characteristics that comply with working in virtual teams this is not possible in DCLAs. Students have to contend with students whose personalities are not suitable to virtual teaming (see section 3.5.9).
“...but problems at remote sites feeling left out needed to be addressed” and “...minorities should not be alone in a group as this can lead to them feeling left out and even dropping out of the group.” after cycle three in the pre-research (Thomas & Brown, 2001).
“If someone can ask me now the starting point of working in distributed team project (sic) I would say first of all know your members” (CS2PE8-37).
“...not all the team members were on the same academic level. This caused each team member to think differently about the same project, creating an end result that was not as uniform as many, myself included, would have liked” (CS2G1-4).

Trust
Role of trust in virtual teams (Ratnasingham, 1998; Jarvenpaa & Leidner, 1999; Kimble et al., 2000; Lipnack & Stamps, 2000; Pauleen & Yoong, 2001; Fernández, 2004; Pauleen, 2004; Panteli & Duncan, 2004; Hertel, 2004; Staples et al., 2004; Hambley et al., 2007; Bergiel et al., 2008; Hunsaker & Hunsaker, 2008; to name but a few).
Swift trust (Jarvenpaa & Leidner, 1999) (also see section 3.5.6).
“People can just ignore e-mail messages, and say that they never received it to avoid being accountable for the work allocated to them” (CS1PE2-23).

Relationships
Role of relationships in virtual teams (Pauleen & Yoong, 2001; Holton, 2001; Hossain & Wigand, 2004; Hertel, 2004; Pauleen & Rajasingham, 2004; Powell et al., 2004; Nandhakumar & Baskerville, 2006).
“I tried not to resort to having the other lecturer speak to my group about doing their work as I thought this would affect the relationship between me and the other team members” (CS1G3-4).

Cohesion
Role of cohesion in virtual teams (Andrews & Schwarz, 2002; Daniels et al. 1998); Akar et al., 2004; Beranek & Martz, 2005; Ocker, 2005; Glückler & Schrott, 2007; Olson-Buchanan et al., 2007).
Students not bonding as a team (see section 3.5.6).
“The PE students meet physically.. and do not relay the details of these meetings to their EL group members” (S1 lecturer in document sent to all lecturers 1999).

Conflict
Role of conflict in virtual teams (Lipnack & Stamps, 2000; Hinds & Bailey, 2003; Fernández, 2004). Conflict in DCLAs is surprisingly low – usually latent and covert (see section 3.5.6, 4.7 & 5.7)

Personality and Cultural differences
Role of culture in virtual teams (Duarte & Snyder, 2000; Suzuki, 2001; Chinowsky & Rojas, 2003; Burtha & Connaughton, 2004; Pauleen & Rajasingham, 2004; Powell et al., 2004).
Students generally enjoyed communicating with people from other cultures (see section 3.5.6).
“...teaches members about different cultures and how each culture thinks and contributes toward the team” (CS2PE1-4).
| Common goals and visions | Role of goals and aims in virtual teams (Haywood, 1998; Bal & Gundry, 1999; Lipnack & Stamps, 2000; Jungalwalla, 2000; Duarte & Snyder, 2000; Chinowsky & Rojas, 2003; Tucker & Panteli, 2003; Wong & Staples, 2004; Staples et al., 2004; Horwitz et al., 2006; Hambley et al., 2007; Peters & Manz, 2007; Bergiel et al., 2008; Curseu et al., 2008). 
"the team should have a common goal, and in our case we had different ideas of solving the problem...it's very difficult to come up with a good output at the end of the day" (CS1PE9-10). |
| Communication: process and tools | Role of communication in virtual teams (Du Plooy-Cilliers & Olivier, 2001; Tubbs & Moss, 2000; Pauleen & Yoong, 2001; Conner & Finnemore, 2003; Griffith & Meader, 2004; Hertel, 2004; Horwitz et al., 2006). 
Time-consuming to communicate in the written word and have delays (see section 3.5.5). 
"The Internet connection to the host server was very slow and communication within groups could take hours" (Thomas & Brown, 2001). 
"For a group of five people to check their mail, do the task and reply can sometimes take a very long time. Also an e-mail tends to be quite short, which can lead to the message being misinterpreted" (CS2PE1-2). |
| Project management | Role of project management in virtual teams (Suzuki, 2001; Arnison & Miller, 2002; Pauleen & Rashingham, 2004; Hambley et al., 2007; Boule, 2008; Curseu et al., 2008) have clearly defined roles and responsibilities to not duplicate work (Brenowitz & Gibbons, 2000; Holton, 2001; Johnson et al., 2001; Conner & Finnemore, 2003; Butha et al., 2004; Pauleen & Rajasingham, 2004; Staples et al., 2004). 
A well managed task reduces wasted time, confusion and frustration (see section 3.5.6). 
"...couple of times, a conflict situation arose between the two campuses over who was going to do what parts of the project" (CS2PE1-2). 
"protocols could be easily broken because there was no direct confrontation if a task was not done as specified" (CS2PE1-3). |
| Team leader | "...other members of the team appeared to be very reliant on the leader" (CS2PE1-3). 
"We all know much of the leader, but not much of each other." (CS2PE2-6). 
89% agreed in the second additional cycle that having a team leader was crucial to the success of the project (survey). |
| Respect | "Ensure that ...people respect the people with authority" (CS1G1-2). |
| External stakeholders | Importance of organisational buy-in in virtual team projects (Kimble et al., 2000; Duarte & Snyder, 2000; Hornett, 2004a, 2004b; Hossain & Wigand, 2004; Wong & Staples, 2004). 
"The faculty involved must buy in to the importance of the project" (Thomas & Brown, 2001). |
| Loyalty | 61% of the students in the survey felt that they were more inclined to work and not let their team down in a virtual than a co-located team.(see section 6.7). |